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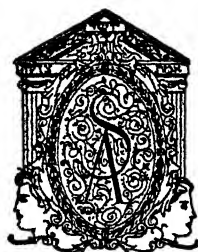
PERSONAL TEMPO — THE KEY TO NORMAL AND
PATHOLOGICAL MENTAL CONDITIONS

BY

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FOREWORD

During the course of some twenty-five years of psychological study, a view of mental organization has emerged which brings normal and abnormal mental conditions together under the same laws and furnishes a principle by means of which they can be better understood.

Capacity to make satisfactory social and vocational adjustment has been shown to depend upon the functioning efficiency of mental potentialities; while deteriorated, psychotic, and border-functioning mental conditions have been shown to be directly related to measurable degrees of mental inefficiency.

The attempt has been made to prove that just as the art of medicine cannot be applied without consideration of the strength or weakness of different bodily organs and functions, so many of the alleged principles in psychology, such as those having to do with environmental conditions, motivation, aims, and mental habits including complexes, phobias, or parental preferences, cannot be invoked as concepts in psychology without consideration of the efficiency with which underlying mental factors can function so as to make re-education and the control of behavior possible.

It has become evident that the concept of efficiency of mental functioning is a basic factor in both normal and abnormal mental phenomena, and that it is of first importance that psychologists perfect the instruments by means of which this phase of mental organization can be evaluated.

These investigations have definitely established that results

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of research are meaningless without some knowledge of both potential intellectual level and the efficiency with which it functions. Advance in the science of psychology will depend greatly upon recognition and control of these two factors.

HARRIET BABCOCK

New York, 1941

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CHAPTER I

INTRODUCTION

Individual Mental Functioning: The Immediate Problem of Psychology:

It was not until the middle of the sixteenth century that the medical profession began to realize that the only way to learn about the human body was to observe and study it directly. It has sometimes seemed as if psychologists were going to require as many centuries to realize that the only reliable source of knowledge about the human mind is the study of the human mind itself — not a group mind, nor minds at a subhuman level, but the separate human minds which distinguish mankind from the lower animals. Psychology, like medicine, must be able to do more than merely observe superficial aspects of behavior. It must explore the mental capacities which underlie behavior. It must ascertain which factors are relatively strong or weak, and determine the relation of the strong and weak phases to normal adjustment. This does not imply the study of psychophysical units, but rather the study of psychological units and the way they change under various conditions of age, intelligence, environment, and mental stability.

As recently as a generation ago, psychologists in mental hospitals could not but fail to be impressed by the lack of exact knowledge on which to base diagnoses of mental conditions. Even when there was recognized mental deterioration resulting from known organic defects, there was no method of gauging the extent of malfunctioning beyond the obvious mental incapacity as shown by delusions, hallu-

cinations, or other bizarre behavior. Decisions as to the mental condition of patients, aside from those who were extremely and obviously impaired or definitely normal, were made on the basis of past history and knowledge of the usual outcome of similar cases.

Yet this field between the normal and the insane is of particular importance. This is true both because of its theoretical implications, and because the functioning of such an intermediate group is still close enough to normal to furnish valuable evidence as to the nature of more extreme mental weaknesses which are characteristic of insanity and extreme mental deterioration.

Slow Progress of Psychology: Early Success of Group Tests:

Many reasons may be given for the slow progress toward the fulfillment of hopes which the extensive psychological work done during the World War had promised for the future of psychology. The surprising success of psychological group testing, as it was then applied to thousands of persons, was in itself a handicap, for it blinded psychologists to the possible significance of the *exceptions* which have kept their correlations and predictions from being perfect. It prevented them from realizing that advance in understanding mental phenomena depends upon working in such a way that test deviations can be related to the persons so deviating, and to their peculiarities of behavior and adjustment.

The Statistical Illusion:

Another reason for the lack of progress has been what might be termed "the statistical illusion" — the tacitly held belief that figures can take the place of thinking, and that it is possible to interpret the end-products of statistical manipulations without sufficient understanding of the nature of the data used in their production. As a result of the faith

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in statistical procedures, we have had much research which may be technically perfect, but which contributes little to psychological theory and understanding because the data used have had inadequate psychological evaluation and because individual exceptions have so often been ignored, together with all clues as to the relation between scores and personalities. Those who study groups ignore individual. Those who make a great point of individual studies often do not evaluate their group significance.

Omissions in the Education of Academic Psychologists:

The problem is closely tied up with an even more fundamental weakness. Persons who are respected as leaders are usually academic psychologists who have received their degrees on the strength of laboratory work in psychology, but who are entirely unfamiliar with the differing levels of intelligence and the differing degrees of stability of the human mind. In consequence, they lack the essential background to give them the psychological insight necessary for the setting up and judging of research. Under existing conditions the direction of research has been too often influenced by the particular interest of the person undertaking it. Some psychologists hope to prove everything by psychophysical studies without realizing that such results are meaningless unless the relations of the findings to other mental factors are known. Others, who started in physics, are often more familiar with physical than with psychological phenomena and tend to state their ideas in mechanical terms of force and stress, even when such figures of speech are not particularly enlightening. Still others try to solve all problems even the validity of psychoanalytic concepts, by the study of animals below the human level, completely ignoring the fact that subhuman species lack the capacity to have the kind of problems upon which light is to be thrown.

Lack of Breadth in the Education of Leaders in Pathological Psychology:

On the other hand, the pathological field which is rich in clues for the understanding of mental organization, is often controlled by persons who have studied medicine but do not practise it, and who work in psychology which they have not sufficiently studied — a situation which has served as an impetus to the influx of unscientific doctrines and procedures. Because of the failure of psychologists themselves to lead the way, too great consideration has been given to unvalidated concepts, and uncritical acceptance of psychogenic theories as the basic cause of pathological mental conditions has been the result.

There are far too many unscientific and unprofessional treatises which issue from the pens of persons who, whether trained in medicine or infused with emanations from Vienna, are not sufficiently trained in psychology. Psychology should follow the example of other professions and not admit into its fold persons who have not had at least a minimum of training in *psychology*.

If the leaders in the academic field had possessed minimum standards of education and training in psychology before entering the research field; if all psychologists had had sufficiently broad experience in studying a minimum number of individuals of different classifications, *including the normal*, under controlled conditions of standardized testing, there would now be relatively few controversial questions of a fundamental nature. The different schools of psychology would be more united on the essential points of departure for research. We would not find merely medically trained persons so often dominating the pathological mental field. We would not have so many articles based on results of single type tests, the value of which has never been determined and the sponsors of which often themselves admit that

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at some later date they are going to validate them on normal persons. When we have one influential class which does not know the human mind, and another which does not know the rudiments of psychology, the results will necessarily be unsatisfactory.

The situation has been similar to that of surgery in the Middle Ages, when barbers performed the surgery, and in consequence, doctors themselves were cut off from the opportunity of observing significant data at first hand. If leaders in the psychological field had spent as much time in studying interrelations of all kinds of mental factors in normal and abnormal individuals, as physicians have to spend in studying the interrelations of physiological conditions, or as psychologists themselves spend in correlating figures, the wide field between the definitely insane or deteriorated and the definitely normal would not have been left in the hands of psychologically untrained persons; and pseudo-psychology would not have become as firmly entrenched as it has in many cases.

Failure to Appreciate the Significance of the Work of Binet and Terman:

The chief cause of the failure of psychology to fulfil its early promise is probably the lack of appreciation of the significance of Binet's contributions; especially his demonstration of the importance of the co-functioning of many different factors in mental organization and his contribution of a unit of measure in terms of developmental levels. This lack of appreciation operated to relegate individual testing to persons inadequately trained either as clinical psychologists or as research workers. It has had the effect of keeping psychological testing outside the requirements of a general psychological education, and has ended in its being too casually considered and without appreciation of its true value.

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Closely allied to this is the failure to see the great possibilities in Terman's work, especially in his appreciation of a *vocabulary spontaneously acquired in the course of development*, which can serve as a measure of potential mental level little influenced by other mental factors.

Lack of Appreciation of the Significance of the Time Factor:

Another great handicap to progress in psychology is lack of appreciation of the *time factor*, and the consequent failure to distinguish between *level of intelligence* and the *efficiency with which intelligence can function*. Confusion due to the interrelations of these two factors permeates all problems of psychology.

If the effects of *time* were studied separately from the effects of *abstract level*, not only would there be a firmer basis for understanding problems of personality and education, but it would be of advantage to the science and art of psychology as a whole.

Fortunately, conditions are already changing. In many quarters where it had been strongly entrenched, belief in the psychogenic nature of pathological mental conditions is giving place to recognition of their essentially somatic basis. Physicians who take up problems of personal adjustment are tending to do less probing into the past history of their patients and are asking for as much scientifically derived information as psychology can provide about their present capacity to meet their problems and to adjust to them.

There is a growing recognition that the amassing of isolated data cannot be advantageously continued without greater realization of the importance of its meaning, or without the controlling influence of some theory which will take into account the known facts to guide research. There is growing awareness that what is characteristic of persons of one level of intelligence or degree of stability cannot be as-

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sumed to apply to others of different intelligence; and that, if measures are to be used to any fruitful purpose, they must be appropriate to psychological data. Even the rather touching faith in the illuminating quality of figures is giving way to realization of the importance of more knowledge about the *source* and *meaning* of the figures.

Of even greater importance in the present stage of development of scientific psychology is the appreciation of the significance of the time element, and of the rich results which will inevitably follow its full recognition and measurement.

It may come to pass that with more understanding and with better control of data which are fed to statistical machines, new factors of a different kind will emerge, or new light be thrown on factors already recognized.

CHAPTER II

APPROACHES TO PSYCHOLOGICAL ANALYSIS

Different Influences in Psychology:

Before one can understand the place of the time factor in psychology, it is necessary to clarify our ideas as to what psychology is. Hypotheses should be stated clearly enough either to permit definite refutation or to serve as a foundation for further work, and to give some meaning to the accumulated mass of data with which psychology threatens to be inundated.

Academic:

There are three definite influences in psychology which tend toward different directions: *The academic* point of view which emphasizes the importance of technique and theory, but which, through lack of broad experience with human minds, is unable to recognize what is most pertinent to differences in human behavior. This inability nullifies psychology's *raison d'être* and prevents the establishment of a basis for a sound working theory.

Clinical:

The second influence is that of the *clinical* field, from which many studies issue, and which has the advantage of being able to show the relation between psychological processes and human adjustment, but which is apt to produce warped ideas because the experience of psychologists in this

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field is usually confined to one type of subject, and conditions are seldom sufficiently controlled.

Psychoanalytic:

The third approach — *the psychoanalytic* — includes methods which have sprung from the failure of the preceding two to furnish scientific foundations for a practical psychology, but which can hardly be called an influence in scientific psychology. It ignores the fact that normal man, as evolved, cannot be understood from a survey of the steps by which he has changed from brute to man unless we know also where he has arrived. The approach starts with preconceived ideas as to the normal man. It derives its basic ideas from a non-representative part of the population, a part which is poor in the efficiency of functioning of that part of the body which is most distinctive in man, the frontal areas of the brain. Thus, instead of helping in the understanding of the whole man, it succeeds only in presenting fantastic distortions.

A Scientific Psychological Analytic Method Recommended:

We suggest a fourth method — that of *scientific psychological analysis*; a method which would recognize the need of considering *man as a whole*, but would realize that the genuine understanding of a whole implies knowledge of the parts. Such a method would not exaggerate the importance of the evolutionary stages through which man has passed at the expense of his present status, but would build up a strong basis of knowledge of man by study and analysis of the different phases of mental organization.

Desiderata of Scientific Psychological Analysis:

A satisfactory theory in psychology should bring together the phenomena of normal and pathological behavior and

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explain both by the same laws. It should provide satisfactory explanations of the differences between them. It should explain why certain factors that correlate highly among normally functioning persons have lower correlations among the abnormal. It should show why very easy tests which correlate highly with verbal level when given to normal persons, correlate less well when given to certain abnormal types. It should be able to determine which factors make some tests correlate highly with each other and which mental factors lower certain correlations. Why does the substitution test, for example, which merely requires matching figures to numbers and which can be understood at a six-year level, have a high correlation with vocabulary even with adult subjects for whom the slow learning of the use of a pencil and paper cannot be invoked as the cause? Why do normally functioning persons of low intelligence generally score lower on all kinds of tests than do persons of high intelligence?

It should account for the fact that a battery of tests is much more significant in regard to ability to make normal adjustment than the sub-tests which comprise it, and for the fact that tests like the Army Performance test, the Porteus Maze test and the MacQuarrie Test for Mechanical Ability — which do not require language — correlate as highly as they do with vocabulary.

It should also explain why pathological patients often do hard tests more easily than they do the apparently easy ones; why reasoning tests are less affected, when at all, by practice, by cultural differences and by differences in stability than are other apparently more simple tests; why very slow and very quick types tend to make a poor adjustment to the various aspects of their vocational and social environment, while persons with normal mental timing generally adjust adequately in these spheres. It should also tell why some per-

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sons of high intelligence cannot use their ability except to their own disadvantage while persons of an inferior level may make satisfactory adjustment.

It must explain the frequent combination of high intelligence and poor school work; and of good school work in the grades and a sudden slump in high school. It must explain why many tests which show a high correlation with scholastic ability cannot be relied upon for prediction in individual cases. It must explain the facts of scattering and must give some idea as to the cause of the kind of scattering which is associated with pathological mental conditions, and show in what way it differs from a benign type of scattering. It should also throw light on changes in IQ.

Delimiting the Field:

However, it is first necessary to consider how the field of psychological inquiry shall be delimited. In order to do scientific work in psychology, it is not essential that we settle the mind-body problem, no matter how interesting such speculation may prove to be. It may well be that the "mind" refers to a certain level of mental activity which appeared in the course of evolution only after the co-functioning of certain basic factors made it possible.

Although body chemistry and physiological conditions have marked effects upon the functioning of intelligence, they do not constitute the subject-matter of psychology. Neither do the neurological correlates of behavior, although there could be no psychology without neural activity. Even though the evidence from our phylogenetic development indicates that cerebral evolution determines the possibilities of the human mind, it is not necessary to trace the evolutionary sources from which the brain and its correlative mental activity are derived in order to understand its present state. The human psyche may have evolved, but it is something

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quite different from its beginnings and from the various stages through which it has passed. In fact, the neurochemico-physical factors may best be thought of as determining the conditions under which the mind can function rather than as determining *how* it functions. This latter can be understood only by a study of the products of the mind under controlled conditions.

Psychology has to accept life and energy — a functioning body and a functioning brain — as primary essentials to mental activity. Though the amount of energy and the health of the parts through which it must function may determine the quantity of the product, it is the type of brain which has gradually evolved and which is inherited that determines the potential quality of the product. Other things being equal, health and energy increase intelligence but in breadth rather than height, in amount rather than quality. The mental machine must be in working order, but the quality of the output depends upon the kind of machine and its control.

While psychology is not physiology nor neurology, neither is it to be regarded solely as a science of overt behavior. Its concern is with the factors which control behavior. Just as electricity can be studied only by its effects, so psychology can be studied only by observation of mental events as shown in behavior. Nevertheless, by reasoning from differences in behavior under varying controlled conditions to the events occurring between stimulus and response, we can learn something about intervening activity.

The phenomena which constitute the subject-matter of psychology and provide its *raison d'être* imply conscious activity either in the present or at some previous time, in such a way that its effects can later be manifested even without clear awareness. Even the so-called instinctive activity of human beings comes under this generalization, since a final

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differentiated response to an undifferentiated urge becomes a matter of conscious attention and gradual selection. The urge to all kinds of activity is innately derived but, because of the number of conflicting drives in human beings and the great variety of possible responses, there is necessarily less similarity of response. This fact is the basis of a very common fallacy; for what is often referred to as repression may actually be disuse through choice and the development of opposing new habits. Persons who suffer from so-called repressions are usually lacking in capacity for normal interests, or are handicapped by poor mental functioning.

Automatic responses which cannot be changed by experience are not to be regarded as psychological events. Psychology probably begins somewhere between purely instinctive response without choice and responses where there is the beginning of awareness due to delayed reaction which permits the effect of a past event to function in response to a present similar event.

Psychology is concerned with the activity that *follows* sensory impressions, especially that which occurs before a response is made: whether stimuli are vaguely noticed and recognized as similar to previous impressions, or whether they are followed by a higher type of response that may involve comparative analysis and reasoning. When there is no kind of response except the immediate automatic reaction to sensory stimuli without awareness, there is psychological blindness. When a stimulus is recognized as similar to a previous one, we have a low degree of mental activity. If a spontaneous generalization is made from data common to all sensory avenues, we then have mental activity of a higher order. Without some sensory impressions the possibilities of an otherwise high intelligence could never be realized. Helen Keller might have remained an apparent defective had she not had a teacher who was able to instruct her by first using

the only sense avenues through which her mind could be stimulated. On the other hand, many persons with all sense organs intact are actually imbeciles because of their inability to make normal use of the impressions received. In fact, a person may have unusual sensory discrimination in all the functions necessary to a musical career such as pitch, intensity, rhythm, duration, tonal memory, and yet be inadequate either on the response side — so that he cannot play an instrument or control his voice for singing, or on the intellectual side, so that his work can never rise above repetitive mediocrity. It is the innate capacity to abstract, generalize, and reason which determines the kind of mental events possible after sensory stimulation.

The Sensory Phase of Mental Activity:

The sensory phase is the basis of special interest and, together with correlative motor response, is the basis of special aptitudes. An aptitude may show at any level. Blind Tom, who performed musical feats, was unusual in the sensory-motor phases as well as in the possession of a good memory, but he was low in intelligence so that his musical development never exceeded imitative stunts.

To admit the indispensability of sensory impressions in mental phenomena does not imply a reversion to the idea of sensations as "elements" of psychology. The true unit of psychology is the activity which takes place between impression and response, whether it be conscious awareness or some sort of unknowing conscious activity, such as unawareness of the stimulus until it changes, or associative activity rich in memories, or activity of a high level in which decisions are ruled by recognized general principles. It is this activity between stimulus and response which tends to modify behavior; and differences in this activity distinguish higher forms of mentality from those of a lower order.

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Sensory Discrimination: the First Dimension of the Mind:

Sensory discrimination may be thought of as the first dimension of the mind, or as the length of the plot on which one has to build. It may not be a deep plot. Each sense may have a very limited discriminatory range, but within the limits set by nature, the structure may be beautiful, or not, depending upon the quality of the guiding mind.

Memory: the Second Dimension of the Mind:

Whether or not one will be a genius in the use he makes of his mental data depends upon many important factors. One of these is *memory*. The term is used broadly to include any functioning of a past in a new present. Mental development begins with memory. Memory is prerequisite to all higher mental activity, whether it be reasoning, judgment, or purpose. It is a general factor. We probably have memory in general, and memories in particular. Perhaps one of the reasons that memory has often been considered specific is because studies to prove the point have controlled neither fineness of sensory discrimination, nor intelligence — for no one can remember impressions and ideas which he is by nature incapable of apprehending. We would not say, for example, that a blind man had no memory because he did not remember the things that others saw. Neither would we say that people who could not discriminate colors did not “remember” color patterns which required such discrimination to perceive them. On the contrary, we would realize that sensory defect had prevented them from receiving the first impressions and that their memory, therefore, could not be measured by the presentation of such stimuli.

It is the same in regard to the effects of differences in intelligence. If we test persons of low intelligence for their memory of certain words or ideas, they will declare they never heard them, although they are words in common use.

The reason for this is that they have never grasped the meaning and therefore have never heard them *psychologically*. The situation is much as if anyone hearing an entirely new foreign language were asked to recognize individual words singled out from others.

If we were to compare a dull person and a bright one in memory of a paragraph which is easy to understand, the dull person might remember as much or more than the bright one. But if given an equally long paragraph such as the Terman paragraph which begins: "Many opinions have been given on the value of life—" the dull person would stand no chance, barring special repetitive ability, because he could not grasp the general meaning which holds the whole together. Yet the dull person might have the better capacity for impressionability and recall.

Another rather extreme example of the difference which intelligence makes in learning would be seen if a paired-associates learning test were made up of a series of words, each followed by its opposite. The person of higher intelligence who recognized the words as opposites would seem to learn quickly because only one memory act would be required, namely, recall that the words were opposites, after which he could respond according to his intelligence with no other memory required. The person of very low level, on the other hand, might remember one or two of the words, and for the other responses would try out associated words which were not truly opposite. Yet in pure memory, the person of lower intelligence might rate the higher.

In fact, the problem of learning, of ability to receive and to retain impressions, cannot reach a solution until tests are selected that exclude impressions to which the subjects are psychologically deaf or blind. In other words, the tests must have no parts above the level of intelligence of the persons being tested. Nonsense syllables do not satisfy this

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criterion as well as it at first seems. Persons of low-level intelligence are not as rich in their associations as are persons of higher level and are more apt to do poorly on them, even when they have excellent memory for ordinary data.

Memory can well be thought of as the second dimension of the mind: the more one can learn and remember, the greater one's breadth of intellect and, other things being equal, the better the basis for sound judgment and reasoning.

Level of Intelligence: The Third Dimension:

By this we mean the degree to which one has ability to reason, to grasp abstractions, to see general principles, to recognize like principles in unlike data, to express the results of these activities verbally or otherwise symbolically, and to be able to use the symbols as tools in future thinking. Development toward higher intelligence levels depends upon increasing capacity to abstract and reason in units of increasing complexity, and its correlative symbolic expression.

There has been a growing tendency to belittle innate differences in intelligence and to attribute differences in scholastic ability either to dietary deficiency or to lack of educational opportunity. Among certain groups, the belief in environment as the only cause of differences in intelligence of persons not definitely feeble-minded has become a sort of doctrine to be accepted without question. These people ignore the evidence yearly offered by our public schools where pupils who have had all possible educational advantages and who suffer from no malnutrition fail for the reason that they can neither grasp the necessary abstractions nor perform necessary acts of reasoning.

Given equal educational opportunities and a chance to learn the language, intellectual ability will show spontaneously at an early age. Patients from foreign countries; who

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had had little public school education and who had been classified as mentally deficient because of their lack of scholastic achievements, we have found to rate average scores in intelligence tests and to perform reasoning tests with no difficulty. On the other hand, we come in contact with many persons who cannot profit from their opportunities, nor be taught to perform average reasoning operations by any known methods.

The tendency to belittle differences in native capacity and in educability is too important in all problems of research and adjustment to go unchallenged. It seems to be due to a variety of causes. One of the most important is the failure to consider the *time element*, and to differentiate the efficiency with which one can do things from the quality of the things done. Deviation from standards due to differences in efficiency cause much confusion. When efficiency is good, it is a great aid in the adjustment of persons of low intelligence. When it is poor, it is a great handicap even to persons of superior intelligence.

Another cause of the failure to realize the importance of native capacity is the tendency to consider differences in intelligence as due to chance combinations of specific factors. This ignores the large number of persons who show no defect in either perception or learning and who have a vast store of memories but who are nevertheless unable to use their data in any except inferior or mediocre ways.

Still another cause is to be found in the doubtful criteria used in choosing tests and in judging from them. Often they are selected merely because they correlate highly with other known tests of intelligence, when these require only very low levels of ability to abstract and reason. Such substitutions of quantity for quality are unwarranted and indefensible.

Other doubtful criteria used in choosing tests and in

judging from them include vocational success, amount of money earned, presence of the name in *Who's Who*, or being the first to have done something noteworthy. These criteria ignore the inequality of the intellectual demands of different schools, colleges and vocations, as well as the varied types of work within them.

Sensory Impressionability and Learning as Propaedeutic to Intelligence:

Inclusive of all these causes is the lack of an adequate theory to account for known facts and to control research.

If we consider sensory impressions and learning ability as propaedeutic to the development of innate intelligence, but not as its essential characteristics, the problem becomes surprisingly clarified. Such a viewpoint is consistent with what is known of the evolution of the brain, since there was no abstract-verbal ability, although there was sensory discrimination and learning ability, before the pre-frontal areas had developed. Sensory impressions and memory may be considered as feeders for the higher levels, but they do not determine the quality of the more recently developed capacity for the kind of mental activity which characterizes the human being.

All our evidence points to the validity of the concept that ability to abstract and generalize and to express these mental activities symbolically is the essential factor in the evolution of higher intelligence. This ability can not be explained, but should be accepted just as we accept other natural phenomena such as living, seeing, and hearing. This ability expresses itself spontaneously and without training, manifesting itself as soon as one has had a chance to learn the verbal tools with which to show it. If man is not born with this essential ability, he cannot learn it. If he is born with it, he has to learn to express it. Hence, because the use of tools of thought must be acquired, we see increasing ability in the

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average child with increasing age, though his IQ — his potential ability — is the same at every age.

The Human versus the Infra-Human Mind:

The essential ability to use verbal tools in thinking is what distinguishes the human being from the animal. The important consideration about human intelligence, despite recent emphasis on man's animal nature, is not how it resembles but how it differs from that of the lower animals. Just as primates may be distinguished from the lower animals by the use of tools, men may be distinguished from the primates by the use of symbolic tools such as language. Both men and animals may reason, but the lower animals probably cannot reason unless the data are of a concrete nature because symbols are needed to hold an idea while other possibilities are being considered. When zoölogists report, as they occasionally do, that the mind of a fish or of some other animal is like the human mind "because it can form associations," they show either that they know little about the essentials of the human mind or that they have, unfortunately, met the wrong people. When we hear of efforts to study the validity of psychoanalytic concepts by studying sub-human animals or feeble-minded human beings, we realize that the time has come to point out the importance of man's distinguishing differences from the lower animals, if psychology is to function to the advantage of society.

The Brain an Instinctive Organ:

The point is that the highly developed cerebrum is as much an instinctive organ as any part of the body, an organ that demands its own satisfactions of an intellectual nature, which should not be repressed. The fact is too often ignored by many practitioners who fail to give this most typically human instinct a place in their theories of human satisfactions and their ideas as to satisfactory adjustment.

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Effect of Level of Intelligence on Other Mental Factors:

The level of intelligence affects the use made of the other factors of mental activity. It determines the kind of data one can comprehend and how they can be used. It influences one's interests and ambitions. It increases the amount one can remember, not by improving 'native impressionability and retentivity, but because the ability to classify and form concepts which can be expressed verbally greatly increases one's memory capacity. One act of memory, for example, can include all the items assumed under the common word "animal": two eyes, nose, mouth, etc., the many attributes which belong to all members of the class. Another memory-act can fixate the important point noted. Thus, with merely a two-length span (*animal* plus the trait that is noted) more can be remembered about a particular observed event than an imbecile could learn in a lifetime. Such generalizations save time and make possible a vast amount of mental work which could never be accomplished otherwise.

A good example of this type of time-saving generalization is the induction test at the fourteen-year level of the Terman-Merrill Intelligence scale. In this test, a person of lower level who concentrates well may answer the first parts correctly. However, unless he grasps the rule and expresses it verbally, there is no possibility, no matter how hard he concentrates, of his being able to tell the increasing numbers up to or above 64 and 128. On the other hand, persons of higher mental level but with poor concentration, may miss the first parts and be successful with the last part. It is seeing the principles *by grasping the essential likeness between the separate problems and expressing it verbally*, which permits the mind to answer the increasingly difficult problems. This is achieved, not by "flights of imagination," but by combining the use of verbal tools with the innate capacity to abstract and to generalize.

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Plan of Mental Organization:

From the preceding discussion we see that intelligence is not a simple matter the gross amount of which can be represented as equal to the number of the sensory possibilities, multiplied by some figure representing the ability to learn, and that result multiplied by the height of the intellectual level. Instead of conceiving it as a cube with the genius cube larger in all dimensions, intelligence is better represented by an inverted truncated pyramid the sides of which do not rise and widen gradually and evenly, but rather ascend with sudden widenings. These places denote the levels at which either a wider span is possible, or where the emergence of ability to express generalizations verbally has greatly increased memory content and thinking capacity. At a still higher level, the sudden widening would denote the perception of like meaning in apparently unlike data. Such developments cause great increases in the learning dimension though they do not increase the sensory range nor memory spans for discrete data.

The ability to abstract and reason and form generalizations may be considered the most important dimension of intelligence in a civilization in which persons are expected to form judgments, to recognize and resist tacit bribery, and to elect the proper persons to represent them from among several spotless candidates. Other things being equal, the height of a person's achievement will be determined by the strength and direction of his purpose. Its social evaluation will depend upon his character. But other things are not equal. The kind and quality of purpose is necessarily limited by level of ability to comprehend; and the growth of character depends on capacity to act in accord with general principles of a subjective nature of a kind to which the ordinary man cannot attain.

CHAPTER III

THE TIME ELEMENT IN MENTAL FUNCTIONING

Mental Ability and the Time Factor:

There are differences in ability even when capacities for responding to sensory data, for remembering them, and for using them according to one's level of intelligence, are equal. These differences are attributable to the *time* factor as it operates in some or all parts of the mental process.

The Meaning of "Time:"

The word "time" is not used in this study in a mystical or metaphysical sense. Time is regarded as a concept derived from experience — as arising from the fact that one can recall experiences and know that they are not happening in the present; that one can hope for or dread something that has not yet occurred; and that one can be aware of doing something in the present as distinct from remembering or anticipating a similar event. From repeated experiences such as these, concepts of past, present and future are derived. If there were no memory and no anticipation, the time concept could not have developed. What is called the psychopathology of time is due to inability to recall the past normally or to anticipate a probable future, conditions which in turn are probably due to a pathological state of the brain.

Mental Tempo:

To persons who are familiar only with stable subjects, differences in time of response often seem an unnecessary distinction since, other things being equal, a person who

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understands best is the quickest in response. Therefore, there is a high correlation between an individual's abstract intelligence and the speed with which he works. When, however, we get into the pathological field, we note that some persons who can abstract and reason at a high level get confused and are slower in simple tests than are some persons of inferior intelligence, and we realize that mental tempo is an aspect of mental organization which must be separately evaluated.

The Problem of Measuring Mental Tempo:

The measurement of the tempo of the mental processes is not a simple matter and constitutes a problem which offers many apparent contradictions. These contradictions arise from the fact that automatic or practiced responses are quicker than a complete act of perceiving and responding in a way that is not habitual. Some responses of persons who are mentally slow in general are very quick. Impulsive acts performed quickly do not signify good mental functioning. Some idiots and many insane persons are extremely quick in some uncontrolled activity, yet they lack the capacity to comprehend a new situation, to be influenced by reasons *pro* or *con*, and to respond with due regard for the meaning. While a person may be quick in acts which require familiar responses, he may still be slow in perceiving new situations which require the functioning of pertinent associations to give them meaning and to direct an adequate response.

A very quick person, who may seem to have good mental functioning, may respond too quickly in situations which are unfamiliar. He may make errors where thinking is required, because of insufficient time between stimulus and response for pertinent associations to become effective. When this tendency is present to a degree of slight abnormality,

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errors may be made without self-criticism or correction. If responses follow too quickly for any adequate appraisal of meaning or control of response, we have a recognized pathological mental condition.

Another type of person may appear unsocial, inattentive and disinterested because of slowed perception and response. When functioning is extremely poor, associations may be too slow for adequate interpretation of a new situation. Pertinent associations may even function so slowly that a point is reached where there is no mental functioning at all, only unrelated chance ideas. Then, as far as the person is concerned, there is no "time." In both these types, the one quick and the other slow, the true mental processes are slowed. Paradoxically the over-quick type may be actually slower since he never gets the correct response in a controlled setting; for rapidity in achieving an incorrect response is not an asset, nor is it an index of true mental speed.

Other things being equal, the quicker the perception and the quicker the functioning of pertinent associations — provided they are not pathologically quick — the more can be learned in a given amount of time, although impressionability and retentivity may be the same. When perception is slower, less is learned in a given time even though retentivity is the same. The latter fact is one of the peculiarities of young *praecox* and other mildly impaired conditions. We are apt to be surprised at finding that new data are well remembered in spite of apparent mental impairment. This is due to a tendency to associate the disorder with other types of extreme malfunctioning in which new learning is impossible. In *dementia praecox* it is probably the speed of functioning of associations which is first affected while fixation may still be normal, depending on the degree of the defect. Learning in these cases is not impossible; it is merely slow.

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In a normal group, a person may seem to be slow either because his understanding is limited, or because of generally retarded mental functioning. It becomes a nice psychological problem to determine the true cause, a problem which can be solved only by interpreting the factor of slowness by its effects in different mental functions and its relation to the level of intelligence. Only separate individual analysis, with mental level controlled, could have brought to light the picture of loss in learning ability with normal repetition spans which is typical of mild praecox cases and of beginning senility.

Mental Tempo and Age:

Tempo decreases with age. It has been noted that in incipient disorders time changes may occur in different parts of the mental process. As one approaches a normal old age, it takes longer to grasp new ideas and to make motor responses. The important consideration for normality in age is probably the adequate integration of ideas. Ability to reason and generalize may be impaired because of "forgetting" to consider pertinent data, or because of confusion and inability to think clearly and arrive at a conclusion. Although slow, the thinking of an old person may be normal, if the necessity for considering all pertinent factors is kept in mind, if there is self-criticism and a weighing of all possible conclusions; and if no decision is made until all contingencies have been considered.

Tempo and Motor Response:

Time is slowed by motor disabilities, so that one of the tasks of the analytical psychologist is to determine the cause of the retardation: whether it is due to poor muscular control or to the mental factor in the response.

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Tempo and Physiological Conditions:

It is well known that mental tempo is affected by physiological conditions. Endocrinology shows the relation of mental activity to various glandular conditions. We are also familiar with the changes from practically zero functioning, due to lack of oxygen, to a temporary normal condition when the oxygen is supplied. We also are aware of the effects of toxic conditions, fevers, alcohol, circulatory disorders and other well known causes of mental malfunctioning.

Aside from these well-recognized facts, there is also evidence which points to differences of a neurological nature, that is due to general neurological weakness. Whether or not the true cause is chemical and goes back to a congenital condition, the fact seems to be established that just as one may have weak muscles so there may be "weak" brains without any known organic cause; and that the effects may show either in abnormal fatigability or only in differences in efficiency of functioning. The result is that a person may never be able to accomplish as much as others who are of no higher potential intelligence, no matter how strong his purpose or how definite his aims may be. In fact a weak will is probably a result of unsuccessful effort when it does not go back to the even more fundamental cause of the inability of the neural system to carry its energy load. To these groups probably belong the psychopathic personalities and neurotics other than dementia praecox and deteriorated manic depressive patients. This border-functioning group often shows no abnormality of mental tempo in familiar situations, and may make good institutional adjustment. These patients may even make adequate adjustment outside an institution under optimal conditions where their inefficient mental functioning is understood; yet they cannot cope with the unexpected demands of the outside world without the help of others.

It is not that the importance of the time factor has been

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entirely neglected in research, but rather that, because of failure to control other factors, particularly the factor of level, the true significance of time differences and their importance as the key to emotional instability has not been understood.

Inadequacy of Correlations as Sources of Knowledge:

When high correlations have been found between time-limited tests and tests not so limited, they have not been followed by a study of the exceptions. The two malfunctioning extremes have usually been buried in group results, with a consequent loss of data pertinent to both individual psychology and to psychological theory. Also when two very different tests have shown high correlations with each other, these correlations have served as the reason for substituting one for the other with no inquiry into the causes of such relationship. Yet the common factor, as we have found, may be more concerned with time than with the kind of mental activities involved. Consequently in analyzing the mental organization of individuals it is not safe to make predictions from correlations of scores made by groups of persons. It is essential to recognize that the exceptions may be the crucial things to study, and to realize that variations in the results of all pertinent tests should be noted. There is a growing realization that the failure to understand the significance of differences in mental tempo has long kept psychologists from doing effective work in mental hospitals. Because of this failure, together with ignorance of the limitations of the effects of environmental influences, therapeutic procedures have been used in many places reminiscent of some of the practices of the Middle Ages.

Time-limited Tests and Mental Tempo:

The differences between scores of the same individual on

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long and short forms of the same test are important in showing whether there is general slowness, whether there is overquickness with failure to score higher in longer time, or whether results are normal. Such differences in efficiency of functioning affect correlations with intelligence and cause otherwise inexplicable variations according to different time limits.

This failure of long and short forms of test scores to correlate more closely, and the tendency to score differently according to the length of time allowed furnish clues for understanding the interrelations of the separate parts of the mental process and mental activity as a whole — just as failures of the human body to function normally and the search for the causes have been the source of our understanding of anatomy and the basis of scientific medicine and surgery. The medical profession would have made little progress if it had been controlled by the idea that the bodily organs could not be studied separately because they were a “part of the functioning whole”; or if it had insisted that nothing could be learned about separate parts because they could not function alone.

Even though we admit that there can be no intelligence without some degree of efficiency of functioning, and that there can be no functioning without some degree of intelligence, we can nevertheless learn much about the one if the other is properly controlled.

Mental Tempo: the Fourth Dimension:

Mental tempo may be thought of as a fourth dimension of the mind because of its possibilities in quicker, more adequate thinking; the number of possible additional memories; and the acquisition of more experience, which affords a richer apperceptive background and a broader basis for reasoning. Tempo is probably closely related to basic physi-

cal conditions — to the part of man's heritage which he shares in common with the lower animals, and which is more affected by health and congenital conditions than is the ability to grasp abstractions. In short it is a factor which affects all mental activity except the capacity to abstract and reason, and it affects these indirectly by determining the efficiency with which they can function.

To summarize the view on which the author's work on mental efficiency is based: neither sensory perception, span, nor learning ability is the distinguishing characteristic of intelligence, though all these factors are essential to its functioning; nor is motor response, although the final phase in any response may in a sense be regarded as motor. The distinguishing characteristic of intelligence is, rather, the potential degree to which one can abstract and generalize; can express these functions symbolically, and use these symbols in future thinking. This ability determines the kind of data one can perceive and remember, and is the basis of scholastic aptitude. It enlarges one's apperceptive background. It broadens the foundation for good judgment and indirectly adds cubits to one's mental stature. *But its efficient working depends upon the factor of time.*

The following chapters describe the results of investigations carried on according to the principles of the Babcock theory of mental organization. Through experience gained with thousands of cases the author of the 1930 examination presents the results of the revised 1940 test battery which can be applied by other psychologists and verified as to fact-finding and interpretation.

CHAPTER IV

PRINCIPLES UNDERLYING THE SELECTION OF EFFICIENCY TESTS

Antecedents of the Babcock Method:

The direct antecedents of the method employed are: the many demonstrations previously made by various experimenters to prove that there are mental differences among individuals and that these differences can be measured: Binet's insight into problems of intelligence and his appreciation of the importance of the co-functioning of different mental factors in adequate response; Terman's appreciation of the importance of the verbal correlates to mental activity, which furnishes a relatively stable focal point from which to estimate deviations in functioning; Wells's memory examination which was definitely planned to measure the weakness in pathological mental states; and the more recent work of Babcock in measuring mental deterioration and efficiency of mental functioning, which has served to show the place and importance of the time element.

Growth of the Concept of Mental Efficiency as a Factor in General Intelligence:

The development of the concept of mental efficiency as a general factor in intelligence rather than as a factor that is specific for different traits started with the somewhat indefinite but obvious postulate that parietic patients are in some way different mentally from normal persons, with the advantage on the side of the normal, and that this difference

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could be measured. Consequent experimentation in measuring deterioration in parietic cases made no progress in five years because appreciation of the value of controlling *level* of intelligence had not emerged from the idea of controlling intelligence in general. Thus while it was easy to prove differences between deteriorated and non-deteriorated *groups*, little could be proved about the deterioration of many of the individuals who comprised the groups. Later, the value of the Terman vocabulary as a measure of normal level of intelligence — a measure which showed little or no loss in border impairment nor in some kind of gross impairment — was demonstrated¹; and it became possible to measure mental malfunctioning in individual cases.

Dementia Praecox:

After this the method was applied to dementia praecox patients² in whom defect in mental functioning had either not been recognized or was so great that it could not be ignored. The maladjustment had been attributed to psychogenic causes or to emotion arising from environmental stress and strain — to anything in fact except an underlying mental defect. The differences below normal scores for this group were greater than differences found in the normal population though not as great as those shown by easily recognized deteriorated persons. Many of the praecox group gave evidence from their school histories that their mental functioning had been poor long before they were sent to a mental hospital, and probably from birth.

1) Babcock, Harriet, "An Experiment in the Measurement of Mental Deterioration," *Arch. Psychol.*, 1930, No. 117.

2) Babcock, Harriet, *Dementia Praecox: A Psychological Study*, Science Press, Lancaster, Penn.

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Normal Adults:

This was followed by studies of the mental efficiency of normal adults, and a study of school children³ which showed the value of extending its practical applications outside the abnormal field in which it had first been used, to problems of adjustment of a scholastic, vocational and social nature.

Normal Children:

Continued work with increasing numbers of normal school children, who were first studied for standards of comparison, led to consideration of the meaning of the differences in mental efficiency among normal persons who had never been committed to hospitals nor considered abnormal. Relations were discovered between the extremes of efficiency of functioning and marked personality differences, and the contrasting types showed distinctively different profiles of mental functioning⁴.

The fact was also brought out that differences in mental efficiency are related to personality differences as determined by other criteria;⁵ that persons who are very neurotic, very introverted, or very submissive, as shown by the Bernreuter Personality Inventory, have poor mental efficiency, whereas very confident and very dominant persons tend to have normal efficiency.

Other suggestive evidence followed as to the important role of mental efficiency. Groups who were not successfully employed showed generally poorer efficiency of functioning than did the normal groups, though there were individual

3) Levy, Lydia, "A Comparison of the Mental Organization of Normal and Psychotic Children," Unpublished Study.

4) Babcock, Harriet, "The Mental Functioning of Exceptional Children," Proceedings of the Second Institute of the Exceptional Child of the Child Research Clinic of the Woods Schools.

5) Babcock, Harriet, "Personality and Efficiency of Mental Functioning," *J. Orthopsychiatry*, 1940, vol. X, No. 3.

exceptions. Persons paroled from mental hospitals did not give normal efficiency scores. Persons who had had prolonged psychiatric treatment without corresponding benefit usually showed pathologically poor functioning to an extreme degree. Problem children who could not maintain school grades up to expectations based on tests of general intelligence, showed abnormalities and deviations in efficiency which either tended to fall into the two contrasting types — the one too-quick and the other too-slow — or tended to be misleading because of unusually good efficiency united with a relatively inferior ability to abstract and reason.

Drug addicts and epileptics who were not recognized as mentally impaired showed median efficiency scores about three quartiles below normal medians.⁶

Early Corroboration of the Validity of the Level-Efficiency Analysis:

The validity of the basic principles underlying the method was early corroborated by others. Among the first were Schwartz⁷ — in a study of dementia praecox patients; Wittman⁸ — in a study of different types of hospital cases; Barnes⁹ — in studies of epileptics; Rubens¹⁰ — who besides studying different clinical groups, made a study of the separate tests of the battery; Bolles¹¹ — in a work which cor-

6) Dimmick, Graham C., *The Mental Efficiency of Neurotic Drug Addicts*; Hall, Margaret E., "Mental and Physical Efficiency of Women Drug Addicts," *Journ. Abn. and Soc. Psychol.*, 1938, vol. 33; Capps, Harry M., Unpublished Study.

7) Schwartz, Rudolph, "Measurement of Mental Deterioration in Dementia Praecox," *Am. Journ. Psychiat.*, 1932, vol. 12, No. 3.

8) Wittman, Phyllis, "The Babcock Deterioration Test in State Hospital Practice," *Journ. Abn. and Soc. Psychol.*, 1933, vol. XXVII, No. 1.

9) Barnes, Margaret R., "Serial Studies of Patients with Epilepsy," *Arch. Neurol. and Psychiat.*, 1934, vol. 32; "Mentality of Dispensary Epileptic Patients," *Arch. Neurol. and Psychiat.*, 1938, vol. 40.

10) Rubens, Anita, "A Study of Psychotic Groups by Means of the Babcock Test of Deterioration." Presented at the Cleveland Neurological Soc. Meetings, 1935.

11) Bolles, Margaret, "The Basis of Pertinence," *Arch. of Psychol.*, 1938 (New York) No. 212.

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roborated the use of vocabulary as a measure of level; and Capps,¹² in a study of epileptic patients, found changes in efficiency scores, which were in agreement with other criteria for three degrees of mental impairment. Such studies have led to the following principles upon which research in efficiency of mental functioning is based.

Psychology a Unitary Science:

There can be only one psychology. Separation into different fields has been a detriment to the science. We cannot separate an educational psychology nor a medical psychology nor even an academic or abnormal psychology from other branches, with the idea that their subject-matter and methods can be different. The initial approach to all — even the normal and pathological — should be the same, except for differences in emphasis according to the particular problem involved. Psychological research should first of all concern itself with fundamentals which are applicable to the study of all types of subjects from the most malfunctioning and deteriorated to the most stable.

Mental Tempo the Key to Normal and Pathological Mental Conditions:

Mental tempo, which determines the efficiency phase of mental activity, is the key to better understanding of both normal and pathological conditions. Mental efficiency and abstract ability are two variables which demand special consideration in all problems, whether of a practical nature or for purposes of research. Further progress will depend upon recognition and control of the time aspects of mental

12) Capps, Harry M., "Vocabulary Changes in Mental Deterioration," *Arch. of Psychol.*, 1939 (New York) No. 242.

ability. The sterility of much research and many misleading conclusions are due to failure to control this factor. Conclusions based on statistical studies which use only averages and standard deviations are inadequate because the significance of the effects of extreme scores which result from differences in mental tempo are lost sight of. We have, for example, seen proofs that "warming up" is not to be considered important in mental work because certain statistical studies did not bring it out; yet the fact remains that while it is not important with a normal middle group, persons who are at one end of the distribution of mental efficiency are so slow in warming up that it is a handicap to their adjustment, while persons who are at the other end of the efficiency distribution may tend to be over-quick in their approach to all problems. To consider only the middle range in which time differences do not clearly affect behavior is like assuming that there is no sickness because the majority in a group do not show any symptoms. Mind readers and mental fakirs may be justified in taking chances on the facts about the average middle group, but the laws of chance are not sufficiently trustworthy to be relied upon as bases for advice in individual cases, especially when it is usually the exceptions who need the advice.

Mental Tempo a Phase of General Intelligence:

The time aspect of behavior which shows in mental efficiency is not to be thought of as separate from intelligence or as something to be contrasted with it, but rather as one phase of intelligence — a phase which is of the greatest importance in problems of adjustment. If sensory impressions and motor ability are controlled by having tests of capacity which require only a minimum of sensory discrimination and motor control; if level of intelligence is controlled by using a valid test which is little affected by

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differences in education; if we compare scores with those of persons of the same level; and if the tests are timed or time-limited — then the resulting scores should differ according to mental efficiency. At the present time, the need for making this distinction is urgent. Failure to take it into consideration is one of the causes of great confusion in psychological problems, while recognition of its significance clears up many apparent contradictions.

Need of a Specially-planned Examination:

While it might seem as if any tests which are timed or time-limited would suffice as measures of mental efficiency — and while in the hands of sufficiently experienced psychologists they can serve as indicators of the quality of mental functioning — it is impossible to show to what extent scores of many tests are due to the level of comprehension or to mental efficiency. Some of the separate parts of different examinations measure efficiency rather than level because they do not have scores extending over a sufficiently wide range of capacity. Also, poor or good functioning shows better at some levels of intelligence than at others; and again examinations are usually planned with the express purpose of correlating as highly as possible with the essentials of intelligence as shown by scholastic ability. The greatest weakness in most examinations, from the viewpoint of gauging efficiency of functioning, lies in the fact that there is no point from which to estimate deviations. When some measure which is little affected by functioning, such as the vocabulary, is taken as a focal point, as was done in the study of the Short Army Performance Scale,¹³ deviations from the vocabulary score furnish persons who are practised in interpretation and capable of noting possible exceptions,

13) Babcock, Harriet, "The Short Army Performance Scale in Clinical Practice," *J. App. Psych.*, 1932, vol. XVI, No. 5.

with a fairly accurate indication of the type of mental functioning.

Factor Analysis Inadequate for Determining Mental Factors:

In our present state of knowledge mental factors cannot be determined by statistical analysis. Though factor analysis had seemed to offer great hopes for advance in psychological understanding, it has proved of little value either in the addition of basic concepts to psychological theory or in the understanding of individuals. This is due principally to a lack of any consistent basis for selection of the data which is statistically treated. This in turn is due to lack of experience in studying the human mind on the part of those conducting research, who have usually been stronger on statistical theory as applied to groups than on scientifically derived knowledge of individuals. Adequate controls of level and range of intelligence have not been used either for the tests or for the subjects taking them, and there has been no realization of the importance of the relations between the different mental factors as shown by individual subjects. Clinicians with a knowledge of individual psychology, who possess innate reasoning capacity, have not been able to make use of most of the factors disclosed. To know that a person is at a certain percentile of some unknown population in numerical ability or in mechanical ability would give no idea of his real ability unless we also knew something of his general intelligence, the kind of tests used, the range of ability measured, and the efficiency with which the subject could function.

Extreme Mental Deterioration not a Fruitful Field:

In our present stage of knowledge, little that is illuminating or dependable can be learned from groups of persons who are in extreme states of mental impairment, since they differ too widely from normal to give any clue to the origin

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of the mental changes or to help in formulating the laws governing the course of mental impairment. Their behavior seldom gives evidence of their original potential capacity so that work with them frequently results in wild guesses and reasoning by analogy. These can be refuted only by showing the absurdity of attributing great capacity or purpose to greatly impaired persons who in the intermediate states have definitely been proved to lack the mental attributes necessary for sustained purpose.

Border-functioning Group the Most Promising for Research:

At the present time the most fruitful field for the study of mental organization is the group that lies between the normal and the mentally deteriorated, about whose members there is doubt as to how much of their maladjustment is constitutional, and how much environmental and amenable to scientific analysis and training. This implies special emphasis on the study of extremes of mental functioning among normal persons and the relation of these differences to adjustment; and also on the study of mental differences among psychoneurotics and coöperative examinable cases from different clinical groups.

Psychological study of subjects who have special sensory defects, such as partial loss of vision, are not enlightening, since they are based on the adjustment of normal minds to changed sensory capacity, while in pathological mental conditions one studies about the functioning and possible adjustment of pathological minds whose sensory organs may be intact. The fact that the border group is the one that stands in most immediate need of scientific diagnosis and can probably profit most from it, is a further reason for giving it special attention. If at an early stage one can detect, by scientific methods, weaknesses which are at the root of behavior peculiarities but which are not apparent in the ordin-

any psychiatric interview, there is a chance for re-education and normal adjustment. If, on the other hand, the defect is not disclosed, and consequently, difficulties in education are not understood, the omission leads to harmful methods of analysis and advice.

Weighting and Scoring the Efficiency Examination:

All tests should be weighted according to the same principles to make them readily comparable and indicative of special weakness in any particular mental phase. The unit should be in terms of developmental levels which are the most suitable for the measurement of psychological data. The transmutation of all raw scores into such weighted scores makes it possible to express quantity and quality in units which can be statistically manipulated. This does not imply that each test measures a mental age.

Each test measures merely the capacities required to do it; great discrepancies between the scores would indicate malfunctioning in some or all of the mental phases required to do the particular test. Obviously, in naming the days, to perceive the question and to answer it promptly will have no implications as to intelligence except at very low levels. A high score means that the subject has a high degree of efficiency in perceiving and answering the question and in carrying out the instructions. A score of 15 would mean that the test was done with the promptness of an average person of a fifteen-year level. To fail, however, or to do the test more slowly and with greater difficulty than young children who are just beginning to become familiar with the sequence of days, is of diagnostic significance.

When discrepancies between weighted scores are due to unusually *low* scores on very easy tests, they indicate probable malfunctioning. This was brought out in all the early studies of the performance of psychotics in the Binet scales,

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who showed great weakness in memory in relation to abstract level tests. Such failures are the basis of pathological scatter, while to do tests which require learning and attention to new data, and which are usually done only by persons of higher abstract level, has the opposite implication and is indicative of especially good functioning. Good performance on repetition tests without a corresponding ability to learn are an exception to this statement.

A unit of measure in terms of developmental level is especially suitable to studies of individual mental ability and such units are probably as essential to the advance of psychology as the discovery of staining methods was to neurology. Without it, there is little basis for determining the meaning of differences in scores for different phases of mental functioning. When all the factors in a functioning whole are similarly weighted, weakness in some one factor is immediately evident from the unevenness and discrepancies found. While arbitrary scores could show differences between groups and differences from norms, they would give little evidence as to what the differences mean.

As an example, it means more to think of a ten-year-old boy as 10, or normal average in scholastic ability and only 6 in motor control or learning, etc., than to be told that he falls in some percentile of some group whose real capacity in the trait measured is unknown and the members of which change from year to year. Or again, a number of scores such as 13, 15, 16, 14, etc. for separate factors shows fairly even ability for an average person of 15 mental level. If another person of 15 year intelligence scored 19 in verbal level tests, and 7 or 8 in learning or motor control, it would indicate a generally pathological condition, aside from the special weaknesses indicated.

Because of such considerations, raw scores of the tests in the battery have been weighted by keeping together the

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scores of persons of the same level and by then determining, separately for each level, the ranges and choosing the median or modal score as the point from which to estimate efficiency in the particular task. For example, if the median time for persons with a 15-year vocabulary is 13 seconds, the weighted score for doing the test in 13 seconds is 15. If the time for persons with a 10-year vocabulary is 18 seconds, the weighted score of 18 seconds is 10. Or again, if the average person of 15 mental level gets a raw score of 20 in answering personal questions, the weighted score for a raw score of 20 in that test is 15. Interpolated scores mean simply quicker or slower, or better or worse than higher or lower scores, with no implications as to their agreement with mental level.

Median Scores Preferred to Means:

In determining scores for different mental levels, medians are more suitable than means. They are not affected by pathological conditions which, with our present lack of diagnostic measures, are apt to be found at the lower end of the efficiency distribution, while scores at the upper end are definitely limited by the nature of the tests. Furthermore, the scores are not intended to answer a legal question as to whether a person is to be considered "normal" or not, in which case a wider range of variation might be necessary. They merely indicate deviations from central tendencies and show a general tendency toward quickness or retardation in mental activity.

Scores for normal subjects from six to ten years of age were determined according to yearly development so that they agree with the median score of normal children of these ages. At levels above ten, scores agree with the median scores of persons of the same vocabulary level. Scores below seven are arbitrary and merely mean different degrees of ability with no implication that they are typical scores for

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persons of low levels. The lowest score of 0.5 means that the subject tried to do something regardless of success. It indicates a state somewhat better than stupor, showing willingness although there may be no understanding. Usually in cases of such great impairment there is almost no responsiveness, but occasionally there will be surprising willingness and desire to do things without capacity for comprehending what is to be done.

Importance of Common Measures:

If psychology is to make progress as a science, the measures used must as nearly as possible be instruments of precision, with universal meaning. The same kind of measures should be used for all persons, irrespective of sex or race. Information must necessarily be as definite as possible. If a certain height is necessary, it is more valuable to know how tall a person is than to be told that his height is in the highest ten percentile for his race, especially if the race be so short that only one person in a hundred can reach the desired goal. Different norms for different races and sexes in any measurable trait are neither scientific nor practical. After all, if a person is unable to do a thing or can do it only poorly, his ability is in no way increased by using some euphemistic term or by comparing it with a lower standard. When tests are standardized separately on different groups so that neither their equivalence as to level nor their true relations are known, there are no means of interpreting them nor of getting any insight into the general problem of mental functioning.

Naming Tests to be Avoided:

To specify what is measured in a test aside from indicating exactly the process involved in doing it is to be avoided. Such a custom not only does not help to understand the

underlying factors but is a great source of unnecessary confusion and misunderstanding. Such terms as verbal ability, planning capacity, coöperativeness, and visualization are scientifically and practically meaningless. We cite, for example, the case of a moron who was reported in his test interpretations as having good "planning capacity." This interpretation was based on the fact that he was slow and careful in doing a maze test which he accomplished at the eleven-year level, although his abstract reasoning ability was at the nine-year level. However, he was much below normal in all mental functions including the maze. What he did show was a desirable degree of carefulness and caution which made him do better than most persons of his level and which offered some hope for vocational adjustment. To endow him with "planning capacity," however, was to neglect consideration of his lack of ability to comprehend problems, which limited his capacity to very simple types of planning. *The only meaning to be attached to each test is what actually is done and what can be logically inferred from its relations to other results.*

Zero Scores:

The use of zero scores for certain functions is valid, if their meaning is known. If a person cannot comprehend a task or is unable to do a certain thing, his ability at the time is certainly zero for the particular response required. No matter how many more fundamental factors can function that are necessary to the response, if any one essential is missing, the person is still incapable of the task under consideration. An idiot scores zero in most mental traits although he may have some necessary physical fundamentals which are essential to any response.

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Inadequacy of a Single Comprehensive Score:

Since mental ages were first determined and there was realization of the surprising light which the concept could throw on educational problems, there has been undue absorption in efforts to reduce scores to one figure which would be all-revealing. Although in extreme cases much can be learned with a high degree of certainty from a single score, such as the Mental Age, yet in the majority of cases, and certainly in all problem cases, it is essential to learn definitely about more fundamental factors than any one figure can show. Otherwise, borderline psychotics of superior mental level, dull normal persons who function well, and persons of average general intelligence with normal functioning, will continue to receive the same score and often the same advice as to their future possibilities. Too often this leads to disastrous results for society, as, for instance, when an alert person who is below average in level of intelligence and scholastic ability is kept studying school subjects he cannot understand and only finds happiness when he reaches the final haven of gangsterdom where people at least speak his language. Just as several individuals may be reported to have the same weight even though it is differently distributed over the body and has different implications for health and appearance, so the significance of mental ages and equivalent efficiency scores may be very different according to the consistencies or discrepancies shown among the different mental phases.

All basic mental factors probably function in any controlled mental process, since all require some degree of perception, and perception requires some memory, and spans have to be of some length to hold the words of any question together long enough to give meaning. There must also be the capacity to carry the initial parts of the process over into some kind of action. Consequently, the question is not so

much one of what factors are involved in an activity as it is of the level at which the different factors function as well as how the different mental factors are related to one another. Without such information psychological work will be as sterile as would be the work of a physician if he had only a composite score with which to express the condition of a patient and never noted which of the different organs were strong and which were weak and if he did not consider their relations to the general physical condition. Failure to study separate factors in relation to the others has resulted in false conclusions and has often caused significant differences to be lost sight of in a general average.

The Criterion: Capacity to Discriminate between Adjustable and Non-Adjustable Persons:

The criterion for determining the type of examination to use must be its ability to discriminate between persons who can make normal adjustment irrespective of level of intelligence, and maladjusted persons. It must also discriminate between normal and pathological persons as determined by other criteria. Such an examination should include questions which, in the early days of scientific work with pathological mental conditions, served to bring out failure or weakening in the functioning of old associations and of familiar data, and are of immediate value in extremely impaired conditions. Questions about a patient's name, age, and marital status have a distinct positive value, for if such personal data are forgotten or not promptly recalled, it is of definite significance, since the more primitive responses are the last to stop functioning in mental deterioration; ability to respond to the habitual and familiar lasts long after there is definite loss in the phases of mental efficiency which require the apprehension of new data.

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Efficiency of Functioning Varies in Degree:

Retardation in answering such questions is now known to be typical of certain kinds of mild mental impairment, but early work failed to recognize that there were different degrees of mental loss. At that time the border group between the insane and the normal had not been recognized, and insanity was diagnosed by certain obvious and extreme symptoms. "Psychogenesis" as a possible cause of mental abnormality was a name unknown. There were no problems of degrees of abnormality. A person was either insane or he was not.

Memory also was an all-or-none affair. One either "had" his memory or he had "lost" it. Long after the normal curve of distribution had been demonstrated for numerous traits, a normal curve for memory and recall had not yet been shown; and God help the man who remembered something today that he could not recall yesterday. "Malingering" was the only explanation of such a situation; while retardation of response was interpreted as being due to sheer stubbornness or, according to a later fashion, to inhibition by unholy thoughts. The wide range of gradation in recall from complete loss, as in aphasia, to the prompt recall of young normal mentally efficient adults was not recognized. Later, even when psychologists had begun to make more exact measures, the intermediate weaknesses in memory and recall were not definitely proved because of the wide overlapping of scores of normal and pathological subjects, when level of intelligence was not controlled.

Errors:

Errors should not be disguised by transmuting them into additional time. They are too important as indicators of a certain malfunctioning type and of those aspects of behavior which may be weakest. To penalize errors by adding

proportionate amount of time for each error gives no hint of the functioning of overquick persons who after being so penalized still score higher than other persons of equivalent level. Errors should undoubtedly have separate norms for each kind of mental efficiency test and should always be taken into account in considering the functional aspects of behavior.

Other Desiderata for Measuring Mental Efficiency: Tests Easily Comprehendable:

The tests should be easily comprehended by all subjects. Failure should be unequivocally due to the efficiency phase of response rather than to level of comprehension. When this is impossible, differences in level should be taken into consideration in the interpretation of results.

Tests Readily Acceptable:

The tests should be readily acceptable to persons who are losing in mental efficiency. Such persons have little chance for success to serve as a stimulus to interest. Consequently, the tests must be of such a nature that even deteriorated patients may seem to be doing well. Therefore, tests should begin in such a way as to require little mental effort, and should gradually increase in difficulty. No method of examining should make impossible demands. Pathological subjects should not be expected to wait for certain signals and then respond immediately. The very fact that they cannot conform to such procedures nullifies results in comparison with norms standardized so as to obtain such control. A more important reason however, is that differences in time for comprehending, starting and stopping are data of the utmost significance in efficiency of mental functioning.

The examination should run along smoothly so as not to cause worry or mental strain. It should not be too long.

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Long tests are not essential, since the examination is not intended to measure one's greatest capacity, but rather to detect *lack* of capacity. It should be so arranged that failures and poor scores serve as sure indications of such incapacity. A time limit should be set for many tests in order to avoid fatigue to older or very deteriorated persons.

There should be a large number and variety of tests to tap the functioning of as many mental aspects as possible so that results of one will be corroborated by other tests which demand similar functions. If there is failure to function normally, it should be shown unequivocally. Every test in a battery could be shown to correlate with both intelligence and efficiency, if a wide enough range of intelligence and of efficiency were included. However, that does not make any single test a valid measure since, except in the case of extremely deteriorated persons, many exceptions would be found unless scores were checked by other similar tests. The necessity for a variety of tests, so clearly brought out in Binet's work, is still often ignored in the study of pathological conditions; we still see research based on single tests, often with no norms as standards of comparison and with little or no consideration for individual differences in intelligence.

Standard Order Followed without Gratuitous Exceptions:

It may seem superfluous to mention that tests cannot be chosen from a battery because they are suitable to the subject in the sense that he can do some and is unable to do others creditably. However, such mention is necessary because such a testing procedure has occasionally been reported. This is as absurd as would be a physician's refusal to examine those organs which he already knew were weak. It would merely be ignoring lack of capacity. Any weakness in any mental trait should be brought to light. Later

if a particular weakness is shown to be attributable to lack of opportunity, so much the better for prognosis. A report should indicate a person's true capacity at the time of the examination, including both strong and weak points, and should be used as a basis for subsequent advice and training. In such a way a better understanding of an individual's problems can be achieved and later mishandling avoided.

There is no place for sentimentality in scientific measures. To give a subject a higher mental rating than the facts warrant and then to expect greater success than his capacity will allow is worse than useless. Many unsuccessful careers have been preceded by groundless assumptions of superior ability. This is seen in the efforts to fit alert pupils who are of relatively poor intelligence into scholastic work which they can accomplish only with the greatest difficulty.

A corollary to the above is that in any standard examination, a standard procedure should be followed with no arbitrarily determined omissions based on the assumption that a test cannot be successfully performed. Frequently they *are* performed. The abnormal field is full of surprises, and these surprises give clues to the meaning of psychological phenomena.

Psychological Analysis to Replace Names of Mental Conditions:

The vague generalizations often utilized in cases of doubtful diagnosis, in which the effects of environment and constitutional incapacity are mingled, should give way to more definite statements. Reports which merely describe how a patient appears to an examiner — whether he is described as leaning toward the "introversial side" or as being in a "depressed state" — are about as unenlightening as if no examination had been made. It is essential that there be some evidence for an examiner's conclusions and to have a

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more clearcut meaning of such a word as introverted, since it has been used to describe a wide variety of states from stupidity to studiousness. The causes of mental weaknesses should be determined so that conditions due to incapacity may be distinguished from those due to other more controllable causes.

In summary, some of the chief points of consideration in the clinical study of persons who present problems of adjustment are the following:

1. The tempo of the mental processes is a key to a better understanding of mental capacity.
2. The time factor is potent in all tests.
3. An examination planned to evaluate the time factor must be so designed as to be readily acceptable to pathological subjects.
4. There must be different norms for different levels of intelligence.
5. At the present time, persons belonging to the doubtful group between definitely pathological and normal subjects constitute the most fruitful field of study, because:
 - a. They give evidence of their intellectual level.
 - b. Their brains are still functioning as wholes even though the functioning may not be normal either in time or control.
 - c. They fill the gap in the distribution curve of mental efficiency as the moron filled the gap between normal and low grade intelligence.
 - d. They furnish clues as to the nature of the more extreme pathological conditions and help us to understand such conditions while they are in the process of development.

CHAPTER V

THE MENTAL EFFICIENCY BATTERY

Revision of the 1930 Babcock Examination:

The present examination,¹ planned to show the effects of the time factor, is changed from the original examination² to make it a more valuable instrument. There are more tests than there were in the early examination and the element of time has been made to affect all parts of the efficiency battery. Some tests have been omitted because of poor discriminatory value and because they are dependent upon data not familiar to all subjects especially those who have been shut out from normal contacts since an early age. Three tests which are omitted from the total average are still given because of the light they throw on a person's orientation and psycho-motor-lingual loss. New tests have been added to increase reliability in measuring different functions. There are also more scores for the same tests for the purpose of making it possible to compare different phases of mental activity. These include time for warming up and time after having once started, besides the total time. There are also more abstract-verbal tests which are not a part of the efficiency battery but are valuable in analysis and as bases for mental diagnosis.

Crosses have been used instead of the former diamonds in the motor tests because they require more changes of

1) *The Revised Examination for the Measurement of Efficiency of Mental Functioning*, C. H. Stoelting Co., H. Babcock and L. Levy.

2) Babcock, Harriet, *op. cit.*

direction and better control. Two new motor tests have been added. These require the making of as many *e*'s and as many *n*'s as possible in 20 seconds each. These motor tests are not intended to measure mechanical ability or motor skill, although poor capacity definitely indicates a fundamental lack of motor skill. They measure a motor capacity usually possessed by every one in a stable population so that failure is usually due to mental slowness or poor control. Mechanical intelligence, on the contrary, requires a higher degree of ability to reason, such as that demanded for success in parts of the MacQuarrie test.

Nine tests have been added to help in mental analysis. Five of these are used as efficiency tests. These are color naming, color-digit substitution, Turkish-English underlining, Turkish-English recognition, and counting backwards by three.

Abstract-Verbal Tests:

The other four tests are abstract verbal tests which are not a part of the efficiency examination. These are used to throw light on scholastic level, particularly in testing children who have been institutionalized or otherwise deprived of the usual school advantages from an early age. These tests are a new opposites test, sentence completion, analogies, and number completion.

1. Opposites:

This test was devised particularly to provide another measure of mental level. The words were selected according to increasing difficulty with increasing vocabulary level. In the normal population the number of correct opposites corresponds closely to mental level. The words were selected from 48 words taken from former studies of opposites and were first given to about 500 persons of different mental

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levels to determine the selection. Norms were established on the total normal population to whom they were later given. The easy words were arbitrarily chosen to fill the gap in scores at low levels with no assumption that they correspond to lower mental ability, since the expression of the concept of opposites does not develop at very low levels of intelligence. A score of 4 simply means that one scores farther below the six year level than if he had scored 5. The test can be scored in two ways: for number right, and for time of correct responses. Discrepancies afford clues to types of mental efficiency. These clues must be used with caution, however, and their interpretation requires much experience in measuring efficiency of functioning. With normal persons a higher weighted score for timed opposites would signify quick functioning, but this interpretation is not valid for the over-quick type, since they are apt to give wrong opposites when they are slightly difficult, so that even though the time score is higher than the score for number right, both scores are apt to be lower than normal for the level, and the quickness is mostly in activity which does not require a high degree of mental control. This test, though a valuable aid in most cases of border functioning, is not as good a measure of level for abnormally functioning persons as had been hoped and does not take the place of the Terman vocabulary, since scores drop more rapidly with pathological functioning in both the slow type, who cannot think of words when the opposites begin to get more difficult than the habit level, and in the overquick type, who are apt to respond too quickly and uncritically with the first association that comes to mind.

2. Sentence Completion:

Success in this test depends upon verbal level, memory span, attention range, unconscious functioning of meaning

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and of learned grammatical structure, critical judgment, and persistence, besides even more fundamental factors which function automatically. The drop in pathological conditions depends upon how well language habits have been learned and upon general mental efficiency.

3. Analogies:

This test is not understood by persons much below average levels although persons of low levels occasionally make chance scores. Since all the words are easily understood, it has proved to be more a test of mental efficiency for adults whose intelligence is average or above than a test of level. Children from 12 to 15 CA, of 100 IQ, that is, of average intelligence, and approximately 100 IQ though of different mental ages, make average scores. Scores made by persons of higher levels are much affected by efficiency of functioning.

Children who may appear to have low mental level because of environmental deprivation often do this test readily and show indications of average abstract ability. On the other hand, children of high level who are too quick, often fail because of poor concentration and lack of self-criticism — facts which show the need of some test which remains relatively stable as a basis for interpretation of psychological data.

4. Number Completion:

This test is also one which persons below average intelligence cannot grasp, so that success has a positive value in showing that intelligence level is not low. Quick success indicates intellectual ability above average. Failure, however, is of ambiguous meaning as is failure with analogies and can be interpreted only by its relation to a more stable test of level. As in the analogies test, children may do well

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on this test when their level measures lower on other tests because of lack of opportunity in the use of verbal tools. Number symbols, however, do not take the place of words in mental measures because except in the simplest mental processes, so many persons stop using them at a very early age.

Terman Vocabulary:

This test still proves to be the best measure of mental level so far tried and is reliable in more pathological conditions than other verbal tests experimented with. Its value is probably mostly due to the fact that it draws on old, well-fixed learning which was acquired spontaneously because of natural interest and understanding. Other reasons for its use are the fact that the responses do not depend upon time, which makes it a great asset in border pathological conditions; its excellent standardization; its high correlation with general intelligence united with the fact that in border cases it is practically free from the effects of poor functioning. Reliable results can be obtained long after mental functioning has been definitely impaired. This gives it a particular value when used with the majority of persons who present problems, such as school and clinic cases, possible paroleable hospital patients, psycho-neurotics and the borderline insane. Although it may seem absurd to think that a difference of a few words in a vocabulary score can indicate a higher degree of intellectual potentiality, the fact that the particular words were chosen just because they did correlate with growing intelligence — which is not true of many verbal tests used in research — is sufficient evidence of its validity. It is the kind rather than the number of words defined that distinguishes persons of higher intelligence, and in this particular test quality and quantity go along practically together. As recently as ten years ago, it was argued

that the vocabulary was a "memory" test, but the subsequent experience of the author has shown that one may have a most superior vocabulary when there is not only poor memory but also when there has been lack of opportunity to acquire an extensive vocabulary. Terman's early findings as to its value are increasingly corroborated with the passage of years.

The vocabulary used in our researches has been given a finer scoring than that published in the revised Stanford Binet scale.³ The median score at each level is used because the aim is to get differences in efficiency from a central point rather than to include all persons who could be considered "average." The scale has been arbitrarily extended to higher levels. This was first done out of curiosity and for research purposes, but the finer divisions at the upper end have been justified by the fact that the central tendencies of the efficiency scores continue to increase with increasing vocabulary, and make it possible to learn which efficiency factors increase even when there is slight growth in efficiency as a whole.

The question of the validity of the vocabulary rating does not affect the validity of the efficiency scores. If for some reason, a vocabulary score is not reliable, the determination of the degree of mental impairment is somewhat more difficult or impossible, but the efficiency score is of significance in itself. In the case of very deteriorated and very psychotic persons an index is seldom needed to show that there is great impairment, since their condition is either obvious or the discrepancy between their scholastic or professional achievement and mental efficiency is revealing even though the degree may not be as exactly measured.

3) This was made possible through the courtesy of L. Terman and M. Merrill who made these data available long before the publication of their examination.

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The final total scores of the efficiency battery have been subjected to the same study as if the original scoring had been arbitrary instead of in terms of developmental units.

Tests In Order of Presentation

1. Personal Information (responses timed)
2. Naming the Days (timed)
3. General Information (not averaged with total score, responses timed)
4. Naming the Months (timed)
5. Counting from 20 to 1 (timed)
6. Paragraph Reproduction (number of memories)
7. Digit-symbol Substitution (three scores: warming up, continuous work after starting, and total time)
8. Digits (number of trials limited. Errors decrease score)
9. Reversed Digits (number of trials limited. Errors decrease score)
10. Naming Objects (timed)
11. Knox Cube (errors decrease score)
12. Motor Tests (writing name, writing United States of America, writing sentence, tracing two crosses, writing e's and writing n's)
13. Color Naming (three scores as in test 7)
14. Color-Digits Substitution (three scores as in test 7)
15. Recall of Paragraph
16. Pronunciation (not averaged in total score)
17. Learning Paired Associates (two trials. Time affects score)
18. Time Orientation (not averaged with total score)
19. Naming the Days in Reversed Order (timed)
20. Naming the Months in Reversed Order (timed)
21. Sentence Repetition (24 sentences of increasing difficulty)
22. Immediate Reproduction of Designs (from Army Performance Scale)
23. Word Recognition (Time and errors affect score)
24. Counting from 64 to 1 by 3 (time limited. Deduction for errors)
25. Opposites (not averaged with efficiency score. Two scores are given — one for efficiency and one for level)
26. Turkish-English (timed)

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27. Analogies (not averaged with efficiency score)
28. Number Completion (not averaged with efficiency score)
29. Sentence Completion (not averaged with efficiency score)
30. Arithmetic (not used in work being reported)
31.
 - a. Recall of Paired associates
 - b. Recall of Digit-symbol substitution (not used in work reported)
 - c. Recall of Turkish-English
 - d. Recall of Color-digit Substitution (not used in work reported)

Obtaining Adequate Standardization Samples:

At first the problem of getting representative sampling of mental efficiency seemed insurmountable. Preliminary work had shown that children of different levels taken from the same school grade could not give results typical of the various abstract levels. In the same grade the higher-level pupils are apt to have poorer efficiency than the lower-level group. The best mental functioning was found among pupils whose vocabularies were equivalent to expectations according to their age-grade levels.

In sampling adults it was necessary to have persons from different kinds of occupations, irrespective of how wide the range of intelligence in any one occupation might be, because some kinds of work, such as typing for example, attract persons of quicker functioning, while other work demands a slower, more cautious type. Neither did it prove advisable to take large groups from relief projects unless those with a record of maladjustment or of a disease which is liable to leave some mental impairment could be excluded. Results with such groups, in spite of exceptions, indicated the probability of a selective factor which tended to keep people out of work. On the average, the mental efficiency of such persons was poorer than that of the average working population. In fact, almost any single group which does

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one type of work or represents one type of school, no matter how wide the range of level, tends to give an atypical distribution of mental efficiency. However, by omitting all subjects who had histories of disease or maladjustment which had led them to seek advice about their mental condition, the group is probably representative of the functioning of the normal population. This is corroborated by the consistency of scores of widely diverse sub-groups.

Standardization Group:

Tests chosen and scored according to the preceding criteria have been given to about 3000 persons. Scores were determined from the performance of 1441 persons, who were making normal adjustment and were from 7 to 24 years of age. The studies also included 184 cases of normal functioning from 25 to 39 years of age; 57 cases of normal functioning from 40 to 70 years of age; 450 State Hospital cases; a group diagnosed as pathological by physicians; and a mixed group from the Vocational Adjustment Bureau which was made up of a wide variety of types of combinations of intelligence and functioning, from stable and unstable persons of superior intelligence to both stable and unstable persons of inferior intelligence.

Subjects from 7 to 16 CA were pupils in the Public Schools of New York City and its environs. Those first selected were pupils whose IQ's ranged from 90 to 110 according to group tests which had previously been administered. These group test scores were used only for initial selection and did not affect the final results. The limits chosen naturally afford a wider range of efficiency than of level. In addition to these normal children, problem or unusual pupils suggested by the teachers were examined. This plan helped to validate the examination while the work was in progress.

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Additional subjects were from high schools, colleges, and from various occupational groups, including persons from a large gas works company, a nursing school, and a civil service group. There were also Y.M.C.A. groups, P.W.A. and N.Y.A. workers, as well as persons individually recommended. Finally a group of 100 were examined in Cleveland in order to check results with those from some other part of the country.

CHAPTER VI

STATISTICAL STUDY OF THE LEVEL-EFFICIENCY EXAMINATION

Mental Efficiency in Relation to Vocabulary: Correlation Data:

The correlations of Total Efficiency scores with Vocabulary are shown in Table I.

TABLE I

Correlations of Total Efficiency Scores with Vocabulary

| CA | N | Selection | Correlation |
|---------|------|-----------------------------------|----------------|
| A 7-16 | 146 | CA equivalent to vocabulary level | .869 \pm .02 |
| B 7-16 | 993 | All vocabularies included | .84 \pm .01 |
| C 20-24 | 319 | All vocabularies included | .85 \pm .02 |
| D 7-24 | 1441 | All vocabularies included | .832 \pm .01 |

Group A, which has vocabulary ratings equivalent to age, probably differs from norms in the tests used only in mental efficiency and in possible age differences which limit or increase one's facility with intellectual tools. The group is made up of persons who are neither dullards nor geniuses, and age and abstract ability are increasing together at approximately equal pace.

Group B, which shows a slightly lower correlation, includes both bright and dull children. The groups have children of higher and lower vocabularies at each age. Thus

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potential level or IQ, as well as age and present level, affects results.¹

With children the distinction between present level and potential level is of great importance, since children of the same level but of different ages have different capacity in their comprehension of tests and in their ability to be successful with them. As our figures will show, a child of twelve with 100 IQ has much better ability than an adult with a twelve-year mental age, whose potential ability is no higher.

In Group C, differences due to development are excluded so that differences in Level represent differences in IQ. However, the samplings of this group below the average levels are somewhat inadequate with the result that the obtained correlation may not be as high as it might otherwise be.

Group D, which includes groups B and C, is composed of persons of superior, average, and inferior mental levels still in the process of development, as well as mature persons who have already achieved the limit of their development at superior, average, or inferior levels. The fact that the correlations are not more affected by the factors of maturity and education shows the close relationship between level of verbal ability and the time factor, or some other less evident factor which affects time.

1) In the following pages, "Level" means the verbal-abstract factor as measured by *Terman-Merrill Vocabulary*. "Total Eff." means the total efficiency score as measured by the average of the six groups of tests which comprise the efficiency examination. "Eff. Index" means efficiency index — the difference between a subject's total efficiency score and the norm. The norm is the median efficiency score of a normal stable group of persons of the same mental level. "Pathological" means abnormally poor functioning, irrespective of cause. "The border-functioning group" refers to persons of poor functioning whose efficiency lies between that of normal persons and very deteriorated or psychotic persons.

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Range of Scores and Vocabulary Levels:

TABLE II

**Range of Scores of Normal Subjects from 7 CA to 24 CA and
from 6 to Superior Levels**

| Level | N | Low | Q ¹ | Median | Q ³ | High |
|-------|-----|------|----------------|--------|----------------|------|
| 6 | 18 | 4.3 | 6.2 | 7.4 | 8.6 | 11.0 |
| 7 | 22 | 5.0 | 6.6 | 8.8 | 9.8 | 11.4 |
| 8 | 43 | 8.0 | 9.0 | 9.6 | 11.6 | 11.6 |
| 9 | 37 | 5.8 | 9.6 | 10.6 | 11.8 | 13.0 |
| 10 | 69 | 8.0 | 10.4 | 11.6 | 12.6 | 15.0 |
| 11 | 109 | 8.4 | 10.6 | 12.0 | 13.4 | 15.8 |
| 12 | 130 | 9.0 | 12.4 | 13.4 | 14.6 | 16.6 |
| 13 | 67 | 8.4 | 12.6 | 14.4 | 15.2 | 17.8 |
| 14 | 148 | 9.2 | 13.4 | 14.4 | 15.6 | 17.6 |
| 15 | 60 | 10.4 | 13.3 | 14.6 | 15.6 | 18.4 |
| 16 | 167 | 11.0 | 14.4 | 15.6 | 16.4 | 19.0 |
| 17 | 119 | 11.0 | 14.6 | 15.6 | 16.6 | 19.2 |
| 18 | 148 | 12.6 | 15.2 | 16.4 | 17.2 | 20.1 |
| 19 | 110 | 13.2 | 16.8 | 17.6 | 18.2 | 20.0 |
| 20 | 75 | 13.4 | 17.1 | 18.2 | 19.2 | 21.2 |
| 21 | 15 | 16.0 | 18.6 | 18.6 | 19.4 | 20.0 |
| 22 | 5 | 18.4 | 18.6 | 20.0 | 20.0 | 20.2 |

Table II shows a steady increase in median scores with increasing vocabulary level. The consistent increase throughout the interquartile ranges together with the high correlations found with Vocabulary is in agreement with previous findings in measuring mental efficiency, and strengthens the thesis that mild impairment of mental functioning must necessarily be evaluated by reference to some measure of abstract level, which is practically unaffected by efficiency of functioning. Even in great impairment it is enlightening to estimate mental level as well as possible from the history when it cannot otherwise be reliably determined.

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Children Compared with Adults:

TABLE III

**Median Scores of Children Compared with Scores of Adults
at Different Levels**

| Level | 7 to 19 CA | Approx. IQ | 20 to 24 CA | Approx. IQ |
|-------|---------------|---------------|----------------|---------------|
| 6 | 7.8 | | 5.0 | 40 |
| 7 | 8.6 | | 9.0 | 47 |
| 8 | 9.6 | 100 | 10.0 | 53 |
| 9 | 10.6 | 100 | 10.6 | 60 |
| 10 | 11.6 | 100 | 11.6 | 67 |
| 11 | 12.6 | 100 | 11.8 | 73 |
| 12 | 13.2 | 100 | 12.9 | 80 |
| 13 | 14.2 | 100 | 13.0 | 87 |
| 14 | 15.0 | 102+ | 14.1 | 93 |
| 15 | 15.6 | 105+ | 14.5 | 100 |
| 16 | 15.8 | 107+ | 15.3 | 107 |
| 17 | 15.6 | 113 | 15.7 | 113 |
| 18 | 16.7 | 120 | 16.4 | 120 |
| 19 | 17.6 | 127 | 17.6 | 127 |
| 20 | | | 18.2 | 133 |
| 21 | | | 19.2 | 140 |

In Table III, we see that adults of very low level tend to score higher than children of the same levels, a fact probably due to social selection, since only those adults whose inferior intelligence is somewhat compensated for by relatively good functioning are found in groups who are not designated as feeble-minded. It is also partly due to the greater amount of adult experience in the use of verbal tools.

We also find that children, from 11 to 15 CA, score higher than adults of equivalent vocabulary rating, a finding probably attributable to the fact that while the approximate IQ's of the children extend from 100 to 105, the IQ's of the adults extend from approximately 73 to 100. The *average* growing child at each age has a mean IQ of 100 with

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potential capacity to reason and abstract at an average level, although he may lack facility in the use of verbal and other motor tools to demonstrate this capacity. An adult of the same vocabulary level has a lower IQ and is incapable of learning to generalize and abstract as well as the average person, no matter how much he is exposed to educational opportunities.

Fallacy of Expecting Equivalent Mental Ages of Children and Adults to be Equal:

These results show the fallacy of assuming that an adult, of a twelve-year mental age, for example, should be mentally equal to a child of twelve and that he should pass the same tests as the average twelve-year-old child; or that tests should be considered unfair to such adults because they cannot pass them. The fact is that young adults of low levels have an advantage in certain kinds of tests because of their greater age and experience, and on some kinds of examinations they tend to score higher than their true developmental level would warrant.

Median Efficiency Scores according to Age: Level Controlled:

Other evidence as to the relationship between mental efficiency and level is shown by the fact that groups of subjects of *different ages* who have the same *vocabulary* tend to have like median efficiency scores. In an average group made up of subjects with 14, 15, and 16 vocabularies who are from 15 to 24 CA, even though the numbers are small and the samplings in some groups are poor, there is a tendency for those of the same level to score the same.

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TABLE IV

Median Efficiency Scores: with Increasing Age: Level Controlled

| | | | | | | | | |
|-------------|------|------|------|------|------|-------|-------|-------|
| CA: | 15 | 16 | 17 | 18 | 19 | 12-18 | 20-24 | 25-29 |
| Voc. Median | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Total Eff. | 15.5 | 15.6 | 14.8 | 14.8 | 14.6 | 14.8 | 15.0 | 14.9 |
| Approx. IQ | 105 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

It may be noted that there is no practical difference between the efficiency of levels 15 and 16. These are the levels that are not differentiated in the Terman-Merrill scale.

Median Efficiency Scores According to Vocabulary: Age Controlled:

It was also shown that the higher the vocabularies of children of the *same age*, other things being equal, the higher the efficiency scores, in spite of the poor sampling at superior and inferior levels, since no effort was made to secure children of higher levels who were also in very advanced classes. These increases of scores with level are probably not as great as a truly representative sampling would show.

TABLE V

Median Efficiency Scores with Increasing Vocabulary: Age Controlled

| | | | | | | | | | |
|------------|------|------|------|------|------|------|------|------|---------|
| Vocabulary | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | or more |
| Age | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | or more |
| Total Eff. | 10.7 | 12.1 | 12.1 | 13.3 | 14.3 | 13.7 | 14.5 | 14.8 | |

Median Efficiency Scores: Age and Vocabulary Increasing Equally:

When we consider a group whose ages are from 13 to 20 with *equivalent vocabularies*, that is, 17 CA and 17 Vocabulary, which means that IQ's are also increasing with age, there is a corresponding tendency for the Median Total Eff. to increase as shown in Table VI. Levels 13 to 17.

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TABLE VI

**Median Efficiency Scores: Both Age and Vocabulary
Increasing Equally**

| | | | | | | | | |
|------------------|------|------|------|------|------|------|------|------|
| Age: | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| Vocabulary: | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| Approx. IQ: | 100 | 102 | 105 | 107 | 113 | 120 | 127 | 133 |
| Total Efficiency | 15.0 | 15.1 | 15.4 | 15.7 | 15.3 | 17.1 | 17.6 | 18.0 |

Again, if we consider increasing vocabulary with age but with a wider range of levels, taking three years each side of the median vocabulary and making the range of each side of the median vocabulary and making the range of each group six years with an equal number of higher and lower intelligence, we find that Total Eff. increases with each higher group but with more of a tendency toward a general normal average than when level is chosen to conform to CA.

TABLE VII

**Median Efficiency Scores: Seven Year Range of Intelligence:
Both Age and Level Increase with a Seven-year Range of
Intelligence for Each Mental Level**

| CA and Median Vocabulary | Vocabulary Range | Median Efficiency |
|-----------------------------|---------------------|----------------------|
| 11 | 8-14 | 12.6 |
| 12 | 9-15 | 13.2 |
| 13 | 10-16 | 15.0 |
| 14 | 11-17 | 15.1 |
| 15 | 12-18 | 15.4 |
| 16 | 12-20 | 15.7 |
| 17 | 13-21 | 15.3 |
| 18 | 14-22 | 16.3 |
| 19 | 15-23 | 16.8 |

Thus the two tables VI and VII tend to corroborate the findings that the nearer one scores to 100 IQ, the more closely

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the scores tend to cluster around a central tendency. For example, at 12 CA when level is equivalent to CA, 37.5 percent score within the limits ± 0.5 . When all vocabulary levels are included at 12 CA, only 22.6 percent score within ± 0.5 from the central tendency of efficiency for their vocabulary level.

Distribution of Efficiency Scores in the Normal Population:

In the normal population the chances of making a low efficiency score are small, as shown by the distribution of efficiency indices of persons from 7 to 24 CA. In studying these, it was found that:

| | |
|------|---|
| 25 | percent score within the limits ± 0.4 |
| 51 | percent score within the limits ± 0.9 |
| 79 | percent score within the limits ± 1.9 |
| 92.3 | percent score within the limits ± 2.9 |

with only 4.7 percent scoring more than 3.0 below the median.

The chances of scoring low at different vocabulary levels are shown in Table VIII.

TABLE VIII

Chances of Scoring Low at Different Vocabulary Levels

| Level | Norms | |
|----------|--------------|-------------------------------|
| 18 to 20 | 16.6 to 18.2 | 96 percent score 12 or more |
| 14 to 17 | 14.5 to 15.7 | 93.3 percent score 12 or more |
| 13 | 14.0 | 91 percent score 12 or more |
| 12 | 13.2 | 91 percent score 11 or more |
| 11 | 12.6 | 92 percent score 10 or more |
| 10 | 11.6 | 93 percent score 9 or more |
| 9 | 10.6 | 93 percent score 8 or more |
| 7 to 8 | 8.8 to 9.6 | 95 percent score 7 or more |

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Quartile Deviations:

The Q differences from norms at different levels are about 1.0, a difference of 1.0 between two scores being of real significance as to efficiency of functioning. The quartile deviations from the median at different vocabulary levels are shown in Table IX.

TABLE IX
Quartile Deviations at Different Vocabulary Levels

| | | | | | | | | |
|------------|-----|-----|-----|-----|-----|-----|-----|-------|
| Vocabulary | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| Number | 14 | 23 | 43 | 38 | 71 | 107 | 132 | 67 |
| Q | 1.1 | 0.6 | 1.3 | 1.1 | 1.1 | 1.4 | 1.1 | 1.3 |
| Vocabulary | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21-22 |
| Number | 151 | 61 | 167 | 123 | 145 | 111 | 71 | 30 |
| Q | 1.1 | 1.1 | 1.1 | 1.0 | 1.0 | 0.7 | 1.0 | 1.2 |

The present examination has a wider range of possible scores than did the earlier Babcock examination owing to the extension of the highest possible score from 21 to 25. Consequently the quartile deviations are larger and have a somewhat different significance.

Efficiency Index:

Since in normal and border-functioning groups the correlation of Total Efficiency with Vocabulary is high, the difference between the norm for Level and the Total Efficiency can be used as a measure of efficiency of mental functioning. The validity of such a method has already been proved in parietic, praecox, and epileptic cases and in other clinically diagnosed groups in published and unpublished studies.

High Correlations No Justification for Interchange of Tests:

The question naturally arises as to why, if correlations with intelligence level are so high, there is any necessity for

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any other examination. As will later be shown, although the correlations are high in a normal population, in the border population in which mental malfunctioning is not marked but is present and associated with maladjustment, correlations with mental level decrease. Also, scores are lower at each mental level. Again, in spite of the high correlations with Level we are dealing with a different factor. It is a factor which correlates highly with abstract level in a normally functioning population because it is essential to the normal functioning of a person's abstract-verbal ability; but it is nevertheless a different kind of mental function. This is shown by the fact that there tends to be a normal distribution of efficiency scores among persons of the same vocabulary level, and also by the fact that there is a normal distribution of efficiency scores when we take a rectangular distribution of levels by arbitrarily selecting an equal number of subjects at each level, as is brought out by the figures in Table X.

TABLE X

Distribution of Efficiency Scores for Subjects Chosen according to a Rectangular Distribution of Mental Levels

| | | | | | | | | | | | | | |
|---------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Level | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| No. each voc. level | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 |
| No. each eff. level | 2 | 2 | 2 | 23 | 21 | 43 | 31 | 39 | 22 | 16 | 6 | 2 | 2 |

Here we see a tendency towards an average norm in spite of the fact that median scores rise with each vocabulary level. More than one-third are at average mental level (14, 15, and 16), and more than two-thirds score from 12 to 18 inclusive.

Chances of Making Poor Scores:

The chances of making poor efficiency scores for subjects

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from 7 to 17 CA with IQs approximately 75 to 125 are as follows:

Of 42 subjects who were 7 and 8 CA and whose median scores were 8.8 and 10.0 respectively, one scored below 6. He was later found to have had spinal meningitis. Nine who scored below 7 had vocabulary levels below 7.

Of 85 subjects who were 9 and 10 CA and whose median scores were 10.6 and 11.5 respectively, 10 who scored below 9 had vocabularies below their age medians.

Of 41 subjects who were 11 CA, the median score was 12.6. Five scored below 11 in efficiency. Three of these had low vocabularies.

Of 185 subjects who were 12 CA, the median score was 13.2. Of these only 8 per cent scored below 11; 3 per cent scored below 9; none scored below 8.

Of 73 subjects who were 13 CA, the median score was 14.2; 31 per cent scored 15 or more. Only two subjects scored below 12.

Of 67 subjects who were 14 CA, the median score was 14.4. Less than 6 per cent scored below 12. These had 11 and 12 vocabulary scores.

Of 101 subjects who were 15 CA, the median score was 14.5. Less than 5 per cent scored below 12. A score below 14 was associated with poor mental efficiency as noted by other criteria.

Of 108 subjects who were 16 CA, the median score was 15.5. Of five who had low efficiency scores, four were of lower abstract level and one had a history of maladjustment.

Of 86 subjects who were 17 CA, the median score was 15.7. Low scores were made by two subjects with 11 and 12 year vocabularies. One of these was described as neurotic and the other was a recognized problem. They showed mental inefficiency equal to that of persons committed to mental hospitals. The content of their conversation was

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normal, however, and they were free from generally recognized diagnostic signs.

Probability of Differences Between Levels Being True Differences:

TABLE XI
Critical Ratios of Differences in Efficiency Scores Between Groups of Different Vocabulary Levels

| Vocab. | No. | 7 to 19 CA | | No. | 20 to 24 CA | |
|---------|-----|------------|----------|-----|-------------|----------|
| | | Diff. | D/P.E.D. | | Diff. | D/P.E.D. |
| 19 - 18 | 69 | 1.14 | 8.41 | 35 | 1.4 | 5.98 |
| 18 - 17 | 106 | 0.727 | 4.97 | 35 | 0.04 | 0.18 |
| 17 - 16 | 75 | 0.29 | 2.09 | 41 | 0.49 | 2.51 |
| 16 - 15 | 121 | 0.72 | 4.11 | 43 | 1.04 | 3.47 |
| 15 - 14 | 49 | 0.50 | 2.71 | 9 | 0.33 | 1.02 |
| 14 - 13 | 129 | 0.27 | 1.69 | 27 | 0.88 | 1.72 |
| 13 - 12 | 56 | 0.65 | 4.11 | 13 | 0.74 | 1.35 |
| 12 - 11 | 116 | 1.16 | 7.79 | 17 | 1.11 | 3.02 |
| 11 - 10 | 94 | 0.66 | 3.84 | | | |
| 10 - 9 | 59 | 1.28 | 4.92 | | | |
| 9 - 8 | 34 | 0.967 | 3.15 | | | |

Although there are not enough cases at some adult levels to establish statistical reliability, it is of significance that the reliable and nearly reliable differences between adult scores are for the most part between the same vocabulary levels as with children, that is, between 18 and 19, between 15 and 16, and between 11 and 12. Differences in efficiency from 8 to 12 CA are probably due to maturation and experience in learning to use the tools of thought as well as to level. Between 13 and 14 and between 14 and 15, although the higher scores are made by persons of higher level, the reliability of the differences is not established. The levels between which differences in scores are not reliable are those for which the new Terman-Merrill examination makes no vocabulary distinction and which had no separate year in the

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old Terman examination. Even when differences are not reliable, the higher levels in each case represent a transition to a higher level of ability in some of the mental factors, while other factors tend to have the same score as those of a lower level. Because of this and because of the help it offers in mental analysis and diagnosis, the separate vocabulary levels have been retained.

Reliability of Efficiency Battery:

The reliability of the test norms and the soundness of the use of the vocabulary as a measure of level was shown as follows:

1. By comparing the scores of the first three hundred persons examined with scores of other groups and with scores of the total normal population tested.
2. By comparing the scores with scores of one hundred persons examined in a midwestern city. This also checked on the possibility of results being due to selection from approximately the same locality.
3. By correlating scores of one-half of the examination with scores on the other half. The coefficient of correlation is .83 when all subjects are the same age and when vocabulary scores are at average levels, that is, 14, 15, and 16. The correlation is .92 when vocabulary scores range from 11 to 20.

Practice Effect as a Variable of Personality Type:

While results of tests which require ability to abstract and reason and express these mental processes verbally are relatively stable, an examination planned for the purpose of measuring mental efficiency in general is readily subject to practice effects, the results of which are *different for different personality types* as well as in *different physical and mental conditions*. Consequently, gains or losses when an

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examination is repeated are diagnostic signs, and in normal groups furnish evidence as to an individual's type of functioning. The average normal person tends to gain slightly in the total score, and especially in the warming up tests and in perception and response to easy tests, because of familiarity with the tests and with the procedure. Normal persons who function slowly may make large gains on a second examination because of knowledge of what is coming. Persons who are naturally alert and quick tend to do their best on the first examination so that there is little possibility of gain. They may even lose slightly in some unimportant parts because they lack the stimulus of an entirely new and interesting task.

The custom of determining an average normal gain when an examination is repeated; of assuming that this gain would be normally made by everyone who took the examination the second time; or that gain on the second examination proves a lack of effort at the time of the first, are unjustifiable assumptions which lead to false conclusions. They ignore differences to be expected between persons of different types of mental functioning; persons of different physiological and neurological conditions at the time of the two examinations; and persons of different degrees of impairment. Consequently, gains or losses made on repeated examinations have to be interpreted in relation to all the facts, such as temporary malfunctioning on the first due to some physical cause which later disappeared, or to slow perception, which would give a chance for greater promptness in a second more familiar situation.

With pathological subjects, great gains indicate general mental improvement. They do not necessarily indicate, however, that a patient will later be able to adjust. Adjustment would be dependent upon the interrelations of many factors including the remaining degree of inefficiency and

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the environmental obstacles which he must overcome. Losses, on the other hand, always indicate a loss in efficiency, whether temporary or permanent. An alcoholic can show great gains if reexamined after the effects of alcohol have cleared away, even though he gave no evidence of intoxication when first examined.

Psychoneurotics and psychopathic personalities often show gain even when their mental functioning is not really improved owing to the fact that their mental weakness is mostly in slow perception and timing of associations, so that familiarity with the situation makes them quicker on a second trial. This knowledge is important, for it may serve as an indication of trainability when the handicap is properly understood. Dementia praecox patients, who are recognizably impaired, are not apt to gain because their slowed learning has become practically no learning. Patients, who have "recovered" from some organic brain condition such as brain tumor, and who seem well enough to make normal adjustment, show pathologically poor mental functioning at about the degree of malfunctioning of possibly-paroleable paretics. Such patients may gain in certain easy tests and yet on the whole score lower than on the first examination, which would show that their mental functioning is not really improved.

That differences in scores at different levels are reliable has been shown by the statistical results and the critical ratios. That they also have psychological significance is shown by their relation to social adjustment. The question of whether the examination in which success is based upon time of mental functioning measures what it was intended to measure is answered by the differences between the scores of normal and unstable subjects.

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Validity: Correlations of Scores with Vocabulary:

Bearing in mind that no persons of extreme mental deterioration were represented by the group; that all subjects were co-operative and able to maintain their interest and effort throughout the examination; and that except for past history of maladjustment, many of them could readily be mistaken for normal, it is significant that the correlations of total efficiency with vocabulary for the abnormal group are less than those of the normal group in all mental phases studied including verbal tests. This is corroborated by Barnes's work on epileptic subjects. She found that for the epileptic group the correlation between Total Eff. and vocabulary level was .67 as compared with a coefficient of correlation of .86 for a normal group, a fact which indicates the effect of some unknown factor. This factor is probably merely the greater variability in the efficiency scores of the members of the pathological group who are in various stages of mental impairment.

In studying the scores of the pathological group, the most noticeable fact is that they are definitely lower than scores of the normal group. While 75 percent of normal persons show efficiency better than 1.1 years below the norms and about 66 percent score better than 0.6 below, none of the pathological groups has a median above the normal Q^1 . Comparing a normal group of twelve year old subjects with a pathological State Hospital group of problem children of the same age, we find that in the normal group, only 25 percent have scores more than 1.0 below median and only 3.7 percent score more than 3.0 below. In the *problem group*, 69 percent score more than 1.0 below and 25 percent score more than 3.0 below.

Validity: Diagnostic Criteria:

To further prove the validity of the examination, patho-

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logical and normal groups were compared by pairing each member of the pathological group as to age and level of intelligence with the members of the normal group. The results — Table XII — show lower median Total Efficiency scores in the pathological group and greater negative indices with decreased ability as recognized by other criteria.

Feeble-minded subjects are not included in this table because they are of lower level. The median Efficiency Index was 2.2 years below norms for their level. A feeble-minded person of average or relatively high intelligence usually shows much greater malfunctioning than one of low level and evidently is not truly feeble-minded since he has average ability to reason although he cannot use it effectively.

TABLE XII

Median Total Efficiency Scores of Various Functioning Groups as Related to Ability to Make Normal Adjustment

| NORMAL STABLE GROUP: (Median Level is 17) | | Median Total Eff. |
|---|--|-------------------|
| Excellent functioning | | 16.8 |
| Normal average functioning | | 15.7 |
| Slow functioning | | 14.6 |
| VOCATIONAL ADJUSTMENT BUREAU GROUP : | | |
| Normal as to history | | 14.7 |
| Abnormal as to history | | 13.5 |
| Organic "recovered" | | 12.1 |
| HOSPITAL GROUP : | | |
| Psychoneurotic | | 14.5 |
| Psychopathic personality | | 13.8 |
| Catatonic praecox | | 12.7 |
| Manic-depressive | | 12.6 |
| Simple praecox | | 13.0 |
| Paranoid praecox | | 12.4 |
| Hebephrenic praecox | | 12.1 |
| Praecox paroled | | 13.5 |
| Praecox non-paroled | | 11.9 |
| ORGANIC GROUP : | | |
| Clinic Applicants | | 11.6 |
| Paretics paroled | | 11.9 |
| Paretics non-paroled | | 9.7 |

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Children who are considered behavior problems either have poor mental efficiency or their mental capacity is misunderstood because of failure to differentiate between abstract level and efficiency of functioning. Persons needing vocational or clinical advice usually have poorer mental efficiency than the population at large, though there are many individual exceptions. Three-fourths of such cases examined in clinics score below normal medians.

Of 55 cases from the vocational clinic who had no known organic brain involvement and who had been variously diagnosed by physicians as neurotic, schizophrenic, or psychopathic personality, or who had been under psychiatric care for a period of time but were considered no longer sufficiently *en rapport* to derive further benefit from their treatment, only 5.4 percent scored at or above the normal median in efficiency of mental functioning, and only 18 percent scored at or above the normal lowest quartile. Of the cases who showed normal functioning as measured by the total efficiency score, two had been diagnosed as psychoneurotic. One of these showed no abnormality and the apparent neuroticism may have been purely environmental, since one parent was a mental hospital patient. Of others in this apparently normal group, one was said to be characterized by day-dreaming and another was said to be in need of a psychiatrist. Both of these showed an abnormal profile of mental functions when their scores were analyzed. The most striking deviations from normal were either in motor tests or in the relation of span to learning ability.

A group examined because they were out of work and were available showed poor efficiency as a whole. Persons at large who had never been committed to an institution but who had been described as "queer," scored lower still. Persons, who had felt the need of psychological advice and who had consulted various practitioners, showed abnormal and

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often typically praecox or manic functioning, which had previously been unnoticed because it was not extreme, and because of the tacit assumption that there was nothing wrong since they were above-average in intelligence and did not show the usual signs of such recognized mental disorders.

Manic-depressive patients, as well as catatonic and simple praecox cases, show even poorer mental efficiency; while those diagnosed as paranoid and hebephrenic were the poorest in functioning of the so-called non-organic groups. Patients with known brain lesions, such as those resulting from paresis and brain tumor, score lower still. Of the known organic cases, who were considered cured or ready for training and placement, only two had normal scores. One of these was considered nervous and was a glandular case.

These comparisons are based on scores of patients who can co-operate and are easily examinable. Persons in the worst mental conditions score even lower. They show varying degrees of malfunctioning. Some make generally low scores but can respond to all tests. Others, whose efficiency is poorer still, show willingness without understanding and seem to try to co-operate in the proceedings without mental clarity. Others cannot give controlled attention at all, although they are not in a stuporous condition. Finally, there may be stupor in which much of even the automatic physical functioning has ceased.

While most of the groups studied differ from the normal group in the degree of their mental inefficiency, definitely insane and very deteriorated persons score entirely below the normal distribution for efficiency of mental functioning. They reach a point where differences in the timing of mental activity have become differences in quality so that there is a difference in kind as well as in degree of mental functioning; and although the exact point where this change takes place is not known, the remaining ability has slight

resemblance to a normal human mind and offers no basis for interpretation of such minds, in spite of the many vestiges of native level which may be seen in speech and movement.

Feebleminded:

Persons diagnosed as feebleminded — that is, persons of low level who cannot adjust — show poor mental efficiency. On the other hand, persons of low level who do adjust socially and vocationally usually function efficiently and score higher than the average person of the same mental level. Of thirteen adults of the group classified as feebleminded who were 7 and 8 mental level, all had very poor mental functioning for even such low level ability, while seven not classified as feebleminded had efficiency scores within normal ranges.

TABLE XIII

**Comparison of Efficiency Indices of Adults of Low Levels
Who Adjust with those Diagnosed as Feebleminded**

| | N | Level | Low | Q ¹ | Median | Q ³ | High |
|------------------|----|-----------|------|----------------|--------|----------------|------|
| Not Feebleminded | 7 | 7-8 yrs. | -1.2 | -0.7 | +2.4 | +2.4 | +2.9 |
| Feebleminded | 7 | 7-8 yrs. | -4.4 | -3.2 | -2.3 | -1.3 | +0.9 |
| Feebleminded | 31 | 6-14 yrs. | -4.8 | -3.3 | -2.2 | -1.3 | +0.4 |

Our results are in practical agreement with those of Bolles¹ who, using the 1930 test, found that her ament group had a median difference from normal of -2.8 years. These results corroborate the previously stated thesis that a feeble-minded person is one who is low in both scholastic level and in efficiency of mental functioning. Persons of the highest levels among the feebleminded usually have the poorest efficiency scores. When persons of even higher levels have

1) Bolles, M., "The Basis of Pertinence," *Arch. Psychol.*, No. 212, N. Y., 1937.

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poor functioning which is not definitely of the dementia praecox slow-perception type, usually they have been described as neurotic. These figures taken together with others casually collected, show that feeble-minded persons are low in both scholastic level and in efficiency of functioning, so that they cannot be used as norms, even for persons of low scholastic levels. Evidently there is some weakness, either congenital or due to disease or a naturally weak physiological and neurological system, which prevents them from making use of their potentialities.

Validity: Normal Population:

The validity of the efficiency analysis as shown by the relation between scores and adjustment, can also be demonstrated in the normal population. The word normal for the purpose of this study refers to persons who have had no history of maladjustment. In such a group² it was found that while correlations between Total Efficiency and Bernreuter personality traits were low, extreme scores were unequivocally related to differences in mental efficiency; that very well-balanced, very extroverted, very confident, and very dominant persons showed normal mental functioning, while very neurotic, very introverted, and very submissive persons made very poor scores in mental functioning.

Meaning of Scores:

The results of the Level-Efficiency studies indicate that persons who have difficulty in making adjustment are more handicapped by poorly timed mental functioning than is the normal population. This applies to all levels of intelligence from very low abstract levels where mental inefficiency determines feeble-mindedness, through the dull normal group whose unknown deviations in mental effi-

2) Babcock, H., "Personality and Efficiency of Mental Functioning," *Journ. Orthopsychiatry*, Vol. X, No. 3, 1940.

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ciency cause them to be misunderstood, up to those of higher intelligence, whose mental inefficiency puts them in the neurotic class, except when it is so great that it can be easily recognized as a pathological condition.

The figures cannot be taken at their obvious face value either as showing significant differences between clinical groups or as showing the points of central tendency of the functioning scores of different groups, because the range of subjects is limited to coöperative patients, the functioning of whose old early learned verbal ability is usually intact. Also, differences from normal are greater at some levels of intelligence than at others, because of the varying nature of the different tests in relation to differences in growth and level. The figures probably indicate that to score from about 2.2 to 3.8 below norms is the central tendency of paroleability or of some kind of adjustability outside an institution. This would depend upon the age of onset of the mental impairment, on skills previously learned and on environmental conditions. Persons of poorer efficiency may also be paroled or may never have been institutionalized due to such other factors as personality types, old habits, formerly learned trades and skills and a protective environment. When persons of nearly normal functioning are not paroleable, the cause is apt to be in a lack of old habits of work upon which they can rely, or a lack of an optimum environment.

Many persons who are quiet in manner and anxious to get work, show, when examined in clinics, functioning which is as poor as that of others who are kept in hospitals indefinitely. However, because of family support and optimistic advice and the absence of anything strikingly abnormal in manner or conversation, these persons had never had a reliable scientific mental diagnosis, and as a consequence their lack of individual success had been attributed to almost anything except the true cause.

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Paretic and Dementia Praecox Patients:

It is to be noted that there is a great discrepancy between scores of average paroleable dementia praecox patients and paroleable paretics. This is probably due, at least in part, to mental differences existing before the onset of observed mental malfunctioning. The praecox defect is usually constitutional. There is much evidence to indicate the existence of the praecox condition from birth, although it may not become noticeable until school and life in general demand increasing competition with other persons. The praecox is thus handicapped all through childhood; he enters an institution while young before he has learned a trade or profession to which he can return. Added to this, there is slowed learning ability as well as slowness in associations in general. Without proper understanding and appropriate training in his school days, he stands little chance in the speed of modern competition, and by the time he has been committed, the situation is practically hopeless. The paretic, on the other hand, has usually had normal mental functioning into adult life and has made a place for himself in the world outside the institution. He often has a family to go back to, and he is apt to have some kind of trade with which he is thoroughly familiar.

In studying the differences in total efficiency scores of these border functioning groups, we find that they overlap the normal group, so that differences between clinical groups are differences in degree of mental malfunctioning rather than distinctive in kind. Such mental abnormality as these groups show is probably more analogous to general ill health as seen in medical practice than to any condition which can be specifically named. It is a general mental weakness undoubtedly due to a neurological or somatic condition, help for which depends first upon a general physical building up — which is often impossible; and then upon measure-

ments of the level of intelligence and efficiency of mental functioning, in order to ascertain what interests and occupations are within the scope of the patient's capacities.

Of this border group the interquartile ranges of only the psychoneurotics and the psychopathic personalities overlap the interquartile ranges of the normal group. Often even these patients, who are not usually considered pathological cases, have median scores within the lowest quartile of the normal group or even lower. Unless some definite organic cause is indicated it is probably obsolete to try to name and classify such mental conditions except in terms of degree of inefficiency in the different mental phases. Differences considered significant in border-functioning cases are often caused by fundamental personality traits which are not a true part of the pathological picture. This is to be found in an apparently alert type that is really slow in controlled mental activity and later is often recognized as a case of *dementia praecox*.

Conclusion:

Our results show that mental efficiency, as measured by a variety of tests which include different phases of mental response and in which the effects of time are emphasized, is positively related to the normal functioning of abstract intelligence. Since mental efficiency is so closely related to mental level it follows that research in mentally malfunctioning conditions which is conducted without control of level cannot be conclusive. Also, since mental efficiency is the basis of normal and pathological behavior, of problems of personality, and of ability to make social and vocational adjustment, the significance of abnormal behavior can best be understood when the degree of inefficiency of mental functioning is known.

The results weaken the foundations of commonly ac-

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cepted assumptions as to the psychogenesis of the psychoneuroses and other border mental conditions and indicate that generally poor mental functioning is an important and basic factor in such conditions.

The fruitful results of the level-efficiency analysis show that research in psychology at the present time could advantageously concentrate on individual deviations. If reports are made in terms of measured differences rather than in estimates based on probabilities, we may begin to arrive at knowledge which will offer a more accurate picture of pathological and insane minds. This will lead to a better understanding of psychology in general, and provide a firmer basis for its practical applications.

CHAPTER VII

STATISTICAL STUDY OF DIFFERENT PHASES OF MENTAL FUNCTIONING

Mental Efficiency Battery Studied by Groupings of Sub-Tests:

The preceding results show that mental efficiency is directly, and probably causally, related to the ability of making normal adjustment and that poor mental efficiency is related to pathological mental conditions and inability to adjust. However, certain individuals make efficiency scores within normal limits when their behavior and adjustment are not normal. Previous studies have shown that when pathological subjects have efficiency scores which are apparently normal, they show greater unevenness in the different phases of mental functioning and greater weaknesses in certain phases than do normal subjects. For this reason, scores on tests which are closely related in some aspect have been grouped and studied separately.

1. Easy Tests:

Group 1 consists of nine very easy tests which can be understood by everyone even at very low levels. Except for persons of extremely low intelligence, these tests measure mostly promptness of perception and response.

Scores for the three parts increase with level as shown in Table XIV. The average increase in total efficiency from Level to Level is 0.66. Group C shows the most steady and substantial rise with an average increase of 0.81. Group B shows the least, the average increase being 0.45 with very

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little change from 14 to 18. This might be attributed to the simplicity of the tests and to the impossibility of scoring much above normal average, except for the fact that there is a surprising increase between levels 20 and 21.

TABLE XIV

Correlations of Easy Tests with Level and with Total Efficiency

| TESTS | | Normal | Pathological |
|---|---------------------------------|----------------|----------------|
| Easy A. | Naming Days | | |
| | Naming Months | | |
| | Writing Name | | |
| | <i>r</i> with Vocabulary | .686 \pm .01 | .397 \pm .02 |
| | <i>r</i> with Total Efficiency | .760 \pm .01 | .607 \pm .02 |
| Easy B. | Personal Questions | | |
| | Naming Objects | | |
| | Recognition | | |
| | <i>r</i> with Vocabulary | .536 \pm .01 | .422 \pm .02 |
| | <i>r</i> with Total Efficiency | .587 \pm .01 | .682 \pm .02 |
| Easy C. | Counting from 20 to 1 | | |
| | Naming Days in Reversed Order | | |
| | Naming Months in Reversed Order | | |
| | <i>r</i> with Vocabulary | .683 \pm .01 | .531 \pm .02 |
| | <i>r</i> with Total Efficiency | .798 \pm .01 | .735 \pm .02 |
| Easy Total: Average of Groups A, B, and C | | | |
| | <i>r</i> with Vocabulary | .753 \pm .01 | .559 \pm .02 |
| | <i>r</i> with Total Efficiency | .827 \pm .01 | .808 \pm .02 |

One might assume that there is practically no difference in functioning between the 17- and 18-year levels and that the distinction between them might as well not be made. However, except for warming up, initial learning, and a motor group, scores are higher at 18 than at 17. It is as if

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the tempo of such fundamentals is for the first time adequate for more efficient learning than is possible for the average person at the 17 year level.

TABLE XV
Median Scores: Easy Tests: Normal Group

| Level | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|------------|------|------|------|------|------|------|------|------|------|
| Easy A | 8.0 | 8.3 | 9.6 | 10.6 | 11.6 | 12.0 | 13.3 | 13.6 | 14.6 |
| Easy B | 11.3 | 11.3 | 12.3 | 13.5 | 13.6 | 14.5 | 15.0 | 16.0 | 16.0 |
| Easy C | 6.3 | 8.5 | 8.5 | 10.3 | 11.0 | 12.0 | 13.0 | 13.6 | 14.0 |
| Easy Total | 8.2 | 9.6 | 10.0 | 11.4 | 11.7 | 12.5 | 13.9 | 14.5 | 14.7 |

| Level | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
|------------|------|------|------|------|------|------|------|------|
| Easy A | 15.3 | 15.5 | 16.0 | 16.0 | 17.0 | 17.0 | 17.3 | 17.5 |
| Easy B | 16.3 | 16.3 | 16.5 | 16.5 | 17.0 | 17.6 | 19.0 | 19.2 |
| Easy C | 14.4 | 15.6 | 16.3 | 16.3 | 17.3 | 18.0 | 18.2 | 19.0 |
| Easy Total | 15.5 | 16.5 | 16.5 | 16.5 | 17.3 | 17.5 | 18.8 | 18.8 |

The high correlations of the scores of the nine tests with Vocabulary are evidently in some way associated with their timing and cannot be attributed to increasing demands upon ability to grasp abstractions, since the tests are understood at low levels. This is partly borne out by the Recognition test in Easy B which shows little difference between levels on a number right basis but which, if scored according to both number right and promptness of response, shows increasing scores with increasing intelligence level. The higher correlation of the whole battery of nine easy tests with Vocabulary, than that between Vocabulary and the separate parts, increases the evidence that the *relation* between mental factors is an important consideration in mental activity.

The results bring out facts not apparent before: that normal persons of higher levels tend to be quicker in perception and response to simple tests; and that persons of *borderline intelligence* are slower in doing them, even though the items are all well within their range of comprehension.

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The *border psychotic* group is slower than normal groups of equivalent Levels, contrary to the expectation that they would respond normally to such simple tests even though they might have lost ability in the apprehension of data. On the contrary, lower scores on some of these tests, especially those in Group B, are often the first measurable evidence of a fundamental weakness which may be the cause of maladjustment. This is probably due to the effect of the recognition test.

If persons from approximately 75 to 125 IQ who are from 13 to 19 CA are selected, it is unusual to find scores much below norms. 63 percent score 16 or higher, and less than 2 percent score below 11. The tendency is for high and low level persons to score near the general average for each age group. As in the Total Eff. score, adults from Levels 8 to 10 tend to score higher than children of the same Levels.

2. Learning:

Learning is a psychological factor about which there is much confusion of thought because of failure to differentiate between the effects of innate capacity to grasp meaning, and ability to fixate and retain impressions. This group of tests includes three which require recall or later recognition of material learned earlier in the examination. They are Recall of Paragraph, Recall of Paired Associates, and Recognition of Turkish-English. In the normal population these learning tests have the lowest correlations with Level of any of the groups of tests studied. This is due to the nature of the learning required, since the tests can easily be understood by persons of low level.

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TABLE XVI

**Correlations of Learning Tests with Level and with
Total Efficiency**

| | Normal | Pathological |
|---|------------|--------------|
| <i>r</i> Learning with Vocabulary | .593 ± .01 | .530 ± .03 |
| <i>r</i> Learning with Total Efficiency | .770 ± .01 | .883 ± .02 |

Although each of the three tests in this group has some quality in common with the others, they are nevertheless psychologically different, and each measures something which the others do not. The Paragraph is a logically connected incident, so that meaningful associations are supplied. The Paired Associates test requires the formation of new associations between words which have no previously learned connections and is the learning test which shows the greatest loss in cases of pathological functioning. The Turkish-English test requires merely recognition of words previously underlined and studied.

The clinical value of the scores on these learning tests varies with the type of mental trouble and with age. The tests used are very easy for normally functioning persons of superior intelligence, who often seem to take the two recall tests as if they were single memory spans. Some of the young dementia praecox patients of superior level make very high learning scores and show their mental weakness more in slow perception in some of the easy tests or in first trials of learning and in warming up.

As in the case of the easy tests, relatively few persons score much below the norms. Of a group of subjects from approximately 75 to 125 IQ and from 13 to 19 CA, more than 63 percent score 15 or higher, and less than 7 percent score below 12. The greatest increases in scores are between levels 5 and 6, 8 and 9, 17 and 18, and 18 and 19. The entire rise at average levels from 12 to 17 is only 1.4 years.

TABLE XVII

Median Scores: Learning Tests: Normal Group

| | | | | | | | | |
|----------|------|------|------|------|------|------|------|------|
| Level | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| Learning | 8.3 | 10.5 | 11.3 | 12.6 | 13.0 | 14.0 | 14.6 | 15.0 |
| Level | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| Learning | 15.0 | 15.3 | 16.0 | 16.0 | 17.0 | 18.2 | 19.0 | 19.5 |

3. Repetition:

Even though a span can be given without subsequent learning and without becoming part of the apperceptive background; and though relatively long spans are common in many types of border functioning, the factor is still an important one because it is essential to any learning. Data must in some way be received before they can be assimilated, and impressions must be associated and integrated if they are later to be recalled under controlled conditions. The distinction between span and learning is essential in mental analysis.

The four repetition tests require immediate response without the necessity of learning. They are:

1. *Digits.* This requires the least mental activity of the four. Success may be due to auditory images united with some unconscious functioning due to familiarity with the words used. It is a test which tends to score normally in some mild dementia praecox conditions and in beginning mental changes with age.
2. *Sentence Repetition.* Success in this requires the unconscious functioning of learned speech habits, which permits a longer span than that for meaningless material or for digits. As a consequence, failure in this test has different implications from failure in digit span. Scores of Sentence Repetition and Digit span used together show steady and substantial increase with increasing levels of intelligence.

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- 3 and 4. *Knox Cube and Reversed Digits*. These are fully as much influenced by the adoption of a method, which is an important tool in the functioning of higher intelligence, as by length of memory span. In abnormal cases, the scores of both tend to drop more quickly than those of the other two tests. They show the least steady gains with increasing intelligence of any of the groups. There are substantial gains between 9 and 10, between 11 and 12, and between 15 and 16. Scores remain practically the same from Levels 5 to 8, 12 to 14, and from 16 to 18. Correlations are as follows:

TABLE XVIII
Correlations of Repetition Tests with Level and with Total Efficiency

| | | |
|---|--------|--------------|
| A. Four Repetition Scores Averaged: | Normal | Pathological |
| <i>r</i> with Vocabulary | .714 | .579 ± .02 |
| <i>r</i> with Total Efficiency | .798 | .80 |
| B. Average of Digits and Sentence Repetition: | | |
| <i>r</i> with Vocabulary | .714 | .600 ± .02 |
| <i>r</i> with Total Efficiency | .738 | .695 |
| C. Average of Reversed Digits and Knox Cube: | | |
| <i>r</i> with Vocabulary | .575 | .481 ± .03 |
| <i>r</i> with Total Efficiency | .712 | .763 |

In a group with IQ's from 75 to 125, the chances are small that normal subjects will make low scores. Of subjects from 15 to 17 CA, 65.3 percent score 14 or higher, and less than 2 percent score below 10. At 13 and 14 CA, 64 percent score 13 or higher, and less than 2 percent score below 9.

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TABLE XIX

Median Scores: Repetition Tests: Normal Group

| Level | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|--------------------|-----|-----|-----|------|------|------|------|------|------|
| A. Total | 8.4 | 8.8 | 9.2 | 10.4 | 11.0 | 11.8 | 12.8 | 13.6 | 13.8 |
| B. Digit-Sentence | 8.0 | 8.5 | 9.0 | 11.0 | 11.5 | 12.0 | 13.5 | 14.0 | 14.5 |
| C. Rev. Digit-Knox | 9.0 | 9.0 | 9.0 | 9.5 | 11.0 | 11.5 | 13.0 | 13.0 | 13.0 |

| Level | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
|--------------------|------|------|------|------|------|------|------|------|
| A. Total | 14.0 | 15.2 | 15.2 | 16.4 | 17.5 | 18.0 | 19.0 | 20.0 |
| B. Digit-Sentence | 15.0 | 15.5 | 16.0 | 17.0 | 18.0 | 18.5 | 19.0 | 20.0 |
| C. Rev. Digit-Knox | 13.5 | 15.0 | 15.0 | 15.0 | 16.5 | 18.0 | 19.5 | 20.0 |

4. Motor A:

The five tests of this group are the last four lines of Digit-symbol Substitution, Writing United States of America, Writing Sentence, and two tests of Tracing Crosses. The tests are not intended to measure manual dexterity but rather to throw light on the mental phase of manual responses. Though they are a necessary fundamental to manual skill, high scores do not imply skill as much as they show the absence of poor mental functioning in the processes involved. Scores depend upon time of perception, time of response, the functioning of learned habits which require a minimum of mental control, speed in continuous work, and a minimum of psychomotor control. The intellectual requirements are not above inferior levels, so that the chief factor in differences in scores is in the time element.

TABLE XX

Correlations of Motor A Tests with Level and with Total Efficiency

| | Normal | Pathological |
|--|--------|--------------|
| <i>r</i> Motor A with Vocabulary | .733 | .454 ± .03 |
| <i>r</i> Motor A with Total Efficiency | .842 | .714 |

In a group of approximately 75 to 125 IQ, of those from

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14 to 18 CA, 67 percent score 13 or higher, and less than 1 percent score below 10. As with other groups of efficiency tests, scores are generally higher at higher levels. Medians increase at all levels although between 6 and 7, 8 and 9, and 13 and 14, differences are slight.

TABLE XXI

Median Scores: Motor A: Normal Group

| | | | | | | | | | |
|---------|------|------|------|------|------|------|------|------|------|
| Level | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Motor A | 7.0 | 7.0 | 8.8 | 9.0 | 10.4 | 12.0 | 13.4 | 13.6 | 14.6 |
| Level | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | |
| Motor A | 15.2 | 16.0 | 16.4 | 17.0 | 18.0 | 18.4 | 19.0 | 21.0 | |

Motor B:

These four tests are tracing the two crosses, writing *e*'s and writing *n*'s. They are less influenced by differences in learned writing habits than the tests included in Motor A. The distinctive mental function required in writing *e*'s and *n*'s seems to be mostly in whatever ability is necessary repeatedly to start responses that are readily understood and easy to perform. It is probably related to basic differences in capacity for speed in discrete motions.

TABLE XXII

Correlations of Motor B Tests with Level and with Total Efficiency

| | Normal | Pathological |
|--|--------|--------------|
| <i>r</i> Motor B with Vocabulary | .652 | .378 ± .03 |
| <i>r</i> Motor B with Total Efficiency | .708 | .518 ± .02 |

These four tests are in many cases the first signs of abnormal functioning. They are the ones in which patients who are described as psychopathic personalities often show abnormality when other mental functioning scores are nearly normal and when the five motor tests, which are

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more dependent upon learned writing habits, show little abnormality. The adult group from 20 to 24 CA scores higher than the groups from 7 to 15 CA of equivalent levels.

In the normal group from 14 to 19 CA with IQ's from approximately 75 to 125, 62 percent score 15 or higher, and 76 percent score above 13, while 90 percent score above 11. A score below 8 is unusual for even moron Levels. Scores increase irregularly, being practically the same at Levels 6 and 7, 12 and 13, and from 15 to 17. Greatest increases are from 10 to 12.

TABLE XXIII

Median Scores: Motor B Tests: Normal Group

| | | | | | | | | | |
|---------|-----|------|------|------|------|------|------|------|------|
| Level | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Motor B | 8.0 | 8.0 | 9.5 | 10.0 | 10.5 | 11.7 | 13.3 | 13.5 | 14.3 |
| Level | | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| Motor B | | 15.5 | 15.5 | 15.5 | 16.3 | 17.5 | 18.0 | 18.5 | 19.0 |

5. Speed of Total Response:

This group of tests is not represented in the Total Efficiency score, because it includes parts which already affect the total score. Scores of this group depend upon speed as a whole, including the total perception and response time as well as whatever happens between the two. The four tests are Digit-symbol Substitution, Color Naming, Color-digit Substitution, and Writing United States of America as quickly as possible.

TABLE XXIV

Correlations of Speed Tests with Level and Total Efficiency

| | Normal | Pathological |
|---------------------------------|--------|--------------|
| r Speed with Vocabulary | .719 | .569 |
| r Speed with Total Efficiency | .839 | .852 |

Scores show substantial increase with mental level, except between 8 and 9, 12 and 13, 16 and 17, and 20 and 21.

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TABLE XXV

Median Scores: Speed Tests: Normal Group

| | | | | | | | | | |
|-------|-----|------|------|------|------|------|------|------|------|
| Level | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Score | 6.8 | 8.6 | 9.3 | 9.4 | 11.0 | 12.0 | 13.3 | 13.4 | 14.0 |
| Level | | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| Score | | 14.7 | 15.8 | 15.8 | 16.5 | 17.5 | 18.0 | 18.2 | 20.0 |

6. Initial Learning:

These tests include immediate Reproduction of Paragraph, first trial of Paired Associates, and Drawing Designs from Memory. They differ from Repetition tests in that the material is longer than can be given back in one span; and they differ from the other learning tests in that there is no lapse of time before reproduction.

TABLE XXVI

Correlations of Initial Learning Tests with Level and with Total Efficiency

| | Normal | Pathological |
|---|--------|--------------|
| <i>r</i> Initial Learning with Vocabulary | .646 | .514 |
| <i>r</i> Initial Learning with Total Efficiency | .803 | .867 |

In a normal group from approximately 75 to 125 IQ, 65 percent score 14 or higher, while 91 percent score 12 or higher. There is a great increase in median scores from 7 to 12. From 13 to 18 they increase regularly although the amount of change is small. Above 19, there is another great increase. Median differences are least between 13 and 14, and between 14 and 15. Adults score lower than children at each Level from 6 to 22.

TABLE XXVII

Median Scores: Initial Learning Tests: Normal Group

| | | | | | | | | | |
|-------|-----|------|------|------|------|------|------|------|------|
| Level | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Score | 7.5 | 8.6 | 9.6 | 11.3 | 12.0 | 12.5 | 13.3 | 14.0 | 14.3 |
| Level | | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| Score | | 14.6 | 15.0 | 15.3 | 15.6 | 17.6 | 17.6 | 18.3 | 19.5 |

7. Warming Up:

Tests in this group include the first line of three tests; Digit-symbol Substitution, Color Naming, and Color-digit Substitution. Many persons, who can do things well after they are once started, are slow in beginning because of slow perception or mental confusion or incapacity to initiate the motor responses required.

TABLE XXVIII
Correlations of Warming Up Tests with Level
and with Total Efficiency

| | Normal | Pathological |
|---|--------|--------------|
| <i>r</i> Warming Up with Vocabulary | .635 | .475 |
| <i>r</i> Warming Up with Total Efficiency | .76 | .755 |

Increase in scores with higher Levels is not as regular as in initial learning, the scores being about the same at 8 and 9, at 12 and 13, at 16 and 17, and from 19 to 22, with a sharp rise between 18 and 19. Adults score lower than children up to Level 19.

TABLE XXIX
Median Scores: Warming Up Tests: Normal Group

| | | | | | | | | | |
|-------|-----|------|------|------|------|------|------|------|------|
| Level | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Score | 8.0 | 8.5 | 9.6 | 9.6 | 10.6 | 12.5 | 13.3 | 13.5 | 14.3 |
| Level | | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| Score | | 15.0 | 15.5 | 15.6 | 16.0 | 17.0 | 17.0 | 17.2 | 17.3 |

8. Easy-Continuous Work:

The four tests in this group include the last four lines of Color-digit Substitution, the last four lines of Digit-symbol Substitution, Recognition of Turkish-English associates, and Counting Backwards by Three's from 64. Any retardation seems to be due either to weak mental tension or to inability to carry out the motor phase of the response.

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TABLE XXX
Correlations of Easy Continuous Tests with Level
and with Total Efficiency

| | Normal | Pathological |
|--|--------|--------------|
| <i>r</i> Easy Continuous with Vocabulary | .754 | .576 |
| <i>r</i> Easy Continuous with Total Efficiency | .886 | .855 |

The median scores show a steady increase with Level. The gain, however, is slight from 8 to 9, from 12 to 13, and from 15 to 17.

TABLE XXXI
Median Scores: Easy Continuous Work: Normal Group

| | | | | | | | | | |
|-------|-----|------|------|------|------|------|------|------|------|
| Level | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Score | 5.5 | 7.0 | 9.2 | 9.5 | 10.2 | 12.0 | 13.2 | 13.6 | 14.2 |
| Level | | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| Score | | 15.2 | 15.5 | 15.7 | 16.7 | 18.0 | 18.7 | 19.0 | 20.0 |

Verbal Tests:

Other tests which are used to help in the mental analysis but which are not a part of the efficiency examination include the following:

Opposites. This test was arranged for scoring in two ways: according to the number right, and according to promptness of response. When these two scores are weighted, discrepancies between them, considered in relation to level, have significance in respect to type and efficiency of functioning.

TABLE XXXII
Correlations of Opposites Tests with Level and with
Total Efficiency

| | | |
|--------------------------------|--------|--------------|
| Number of Opposites Right: | Normal | Pathological |
| <i>r</i> with Vocabulary | .812 | .766 |
| <i>r</i> with Total Efficiency | .749 | .676 |
| Timed Opposites: | | |
| <i>r</i> with Vocabulary | .785 | .655 |
| <i>r</i> with Total Efficiency | .758 | .743 |

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In the normal group the number of correct opposites closely corresponds to vocabulary score. The scores of timed opposites show a tendency to rise with Level, but the gains are slight and median scores are the same at 7 and 8, at 9 and 10, at 13 and 14, from 16 to 18, and at 19 and 20.

TABLE XXXIII

| Median Scores: Opposites Tests: Normal Group | | | | | | | | | |
|---|---|----|----|----|----|----|----|----|----|
| Level | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Opposites | 7 | 8 | 8 | 10 | 11 | 12 | 13 | 14 | 14 |
| Timed Opposites | 7 | 9 | 9 | 10 | 10 | 12 | 13 | 14 | 14 |
| | | | | | | | | | |
| Level | | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| Opposites | | 15 | 15 | 16 | 17 | 18 | 20 | 21 | 22 |
| Timed Opposites | | 15 | 16 | 16 | 16 | 19 | 19 | 21 | 22 |

Sentence Completion: The ten sentences in this test are of increasing difficulty. None of them is extremely difficult, however, and since there are time limits, efficiency of functioning has an effect upon the particular score made.

TABLE XXXIV

Correlations of Sentence Completion with Level and Efficiency

| | Normal | Pathological |
|--|--------|--------------|
| <i>r</i> Sentence Completion with Vocabulary | .712 | .666 |
| <i>r</i> Sentence Completion with Total Efficiency | .702 | .690 |

TABLE XXXV

Median Scores: Sentence Completion: Normal Group

| | | | | | | | | | |
|-------|---|----|----|----|----|----|----|----|----|
| Level | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Score | 8 | 9 | 10 | 12 | 13 | 13 | 13 | 14 | 15 |
| | | | | | | | | | |
| Level | | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| Score | | 16 | 16 | 16 | 17 | 19 | 20 | 20 | 20 |

Analogies: This test has proved to be more a test of efficiency than of Level for a group which is average or above,

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probably because the words are all easily understood and do not require fine discrimination of meaning. In a normal group, success indicates that the level of intelligence is not much below average, because persons much below average do not grasp the concept of analogies. The score is also lowered by poor functioning. In an unstable group, this test measures Level but with a wide margin of error because of the effect of different types of malfunctioning on the scores.

TABLE XXXVI

Correlations of Analogies with Level and with Total Efficiency

| | Normal | Pathological |
|--------------------------------|--------|--------------|
| <i>r</i> with Vocabulary | .579 | .419 |
| <i>r</i> with Total Efficiency | .60 | .577 |

Average children, that is, a group whose median IQ is 100 and who are 11 CA or above, score at average adult level. Median scores of children and adult groups tend to be the same from 12 to 17 CA. Above 17, there is a rise at each level up to 22. This test is not useful with persons of low level. However, it frequently serves to show that persons thought to be of low level are actually of average or higher intelligence.

TABLE XXXVII

| Median Scores: Analogies: Normal Group | | | | | | | | | |
|--|---|----|----|----|----|----|----|----|----|
| Level | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Score | 0 | 0 | 0 | 10 | 12 | 12 | 15 | 15 | 15 |
| Level | | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| Score | | 15 | 15 | 15 | 16 | 18 | 19 | 20 | 21 |

Number Completion: This test is not very enlightening if failed, but it is of value when successfully done. Like analogies it is not grasped at low levels but unlike analogies, it is not fair to all subjects because of the inequality of ex-

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perience in handling numbers and the fear which overcomes some persons when they are confronted with any number whatever. It may measure the Level of persons of superior intelligence because in a normally functioning population, the quickness with which a person can perceive things is a measure of the height of native capacity to comprehend such data, even when the simplicity of the tests makes the efficiency aspect very potent.

TABLE XXXVIII

**Correlations of Number Completion with Level
and with Total Efficiency**

| | Normal | Pathological |
|--------------------------------|--------|--------------|
| <i>r</i> with Vocabulary | .629 | .503 |
| <i>r</i> with Total Efficiency | .640 | .543 |

Median scores show no rise with Level from 12 to 14, from 15 to 17, and from 19 to 20.

TABLE XXXIX

Median Scores: Number Completion: Normal Group

| | | | | | | | | | |
|-------|----|----|----|----|----|----|----|----|----|
| Level | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Score | 0 | 0 | 0 | 0 | 11 | 11 | 13 | 13 | 13 |
| Level | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | |
| Score | 15 | 15 | 15 | 16 | 18 | 18 | 19 | 20 | |

Verbal Level:

This group includes Vocabulary, Number of Opposites Right, and Sentence Completion. These three tests, when averaged together, furnish an approximate measure of general intelligence among stable persons, since the ability to think of opposites within the time limit and the timing of the sentences is affected by the functioning phase of intelligence.

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TABLE XL
Correlations of Verbal Level with Vocabulary
and with Total Efficiency

| | Normal | Pathological |
|--------------------------------|--------|--------------|
| <i>r</i> with Vocabulary | .932 | .878 |
| <i>r</i> with Total Efficiency | .846 | .730 |

TABLE XLI
Median Scores: Verbal Level: Normal Group

| | | | | | | | | | |
|-------|------|------|------|------|------|------|------|------|------|
| Level | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Score | 6.6 | 7.6 | 8.0 | 10.3 | 11.0 | 11.6 | 12.6 | 13.0 | 14.0 |
| Level | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | |
| Score | 15.0 | 16.0 | 16.3 | 17.3 | 18.6 | 19.6 | 20.3 | 21.0 | |

As was found in the case of Total Efficiency, scores on the separate groups of tests are not the same for adults as for children when intelligence level is below adult average. Adults, who can make normal social adjustment, score higher than children from 7 to 10 mental level in promptness of perception and response to easy tests, in motor promptness, and in easy continuous work. Children of average intelligence score higher than adults of the same level in Initial Learning at all levels including the very superior; in Learning with recall, from 6 to average; in Repetition *B* from 6 to 16; and in Repetition *C*, up to 13. Children tend to do better than persons from 20 to 24 CA above average levels, but there is some inconsistency at what might be considered average levels, from 14 to 17 inclusive.

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TABLE XLII

Summary of Coefficients of Correlation of Groups of Efficiency Tests with Vocabulary and with Total Efficiency

| EFFICIENCY TESTS | A. Vocabulary | | B. Total Efficiency | |
|-----------------------|---------------|--------------|---------------------|--------------|
| | Normal | Pathological | Normal | Pathological |
| 1. EASY | | | | |
| a. | .686 | .397 | .76 | .607 |
| b. | .536 | .422 | .587 | .682 |
| c. | .683 | .531 | .798 | .735 |
| Total Easy | .753 | .56 | .827 | .808 |
| 2. LEARNING | .593 | .53 | .77 | .883 |
| 3. REPETITION | | | | |
| a. Four Tests (B&C) | .714 | .579 | .799 | .799 |
| b. Digit and Sentence | .709 | .600 | .738 | .695 |
| c. Rev. D. and Knox | .575 | .481 | .712 | .763 |
| 4. MOTOR | | | | |
| a. Five Tests | .733 | .454 | .842 | .714 |
| b. Four Tests* | .653 | .378 | .708 | .518 |
| 5. SPEED* | .719 | .569 | .839 | .852 |
| 6. INITIAL LEARNING | .646 | .514 | .803 | .867 |
| 7. INITIAL DOING* | .635 | .475 | .760 | .755 |
| 8. EASY CONTINUOUS | .754 | .576 | .887 | .855 |
| TOTAL EFFICIENCY | .832 | .625 | | |

ABSTRACT VERBAL TESTS*

| | | | | |
|------------------------|------|------|------|------|
| 1. OPPOSITES | .812 | .767 | .749 | .676 |
| 2. SENTENCE COMPLETION | .712 | .666 | .702 | .690 |
| 3. TIMED OPPOSITES | .785 | .655 | .758 | .743 |
| 4. ANALOGIES | .58 | .42 | .60 | .577 |
| 5. NUMBER COMPLETION | .63 | .503 | .64 | .543 |

VERBAL LEVEL

(average of 1, 2, and
Vocabulary)

| | | | |
|------|------|------|------|
| .932 | .878 | .846 | .730 |
|------|------|------|------|

* Not averaged in the Total Efficiency Examination.

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The fact that groups of tests have higher correlations with level of intelligence than is found between the parts of the groups and Level — as in Total Easy, Repetition A, and Verbal Level — indicates the great importance of the co-functioning of the different fundamental phases of mental activity and their relative lack of significance when they are considered alone.

Coefficients of Correlation with Vocabulary: Normal Group:

The figures in Table XLII-A show that when normal subjects are considered, all the phases of efficiency measured have high or substantial correlations with Vocabulary. This indicates that growth in different phases of mental efficiency is concomitant with the normal functioning of intelligence.

The lowest coefficient of correlation with Vocabulary is .536 with Easy B. The next lowest correlations are with Repetition C and Learning. These are .575 and .593 respectively. Therefore these tests are probably more related to mental efficiency and less to Level than are the other test groupings. These correlations with Level may be explained by the fact that they require all the elements of intelligent response such as apprehension, perception, holding a problem in mind, the ability to stimulate whatever effects of past events are necessary for meaning and for pertinence of response, the capacity to recognize and use what is appropriate; together with the functioning of different phases of the process in a normal framework of time. This last is inherent in the method used, as normal timing is assumed to be determined by what normal persons do. As we have shown, among normally functioning persons optimal timing is highly correlated with intelligence and is evidently essential to any intelligent response and is probably a factor on which insight depends.

Since the fundamental capacities required in these par-

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ticular tests are used in tasks which are easily understood, the thesis that mental tempo is a most important factor in the correlations is substantiated. This is further shown by work being done with single tests in which, taking the Recognition test as an example, it is found that the coefficient of correlation is .186 with Vocabulary when the recognition score depends upon the number right; but that when time of response is considered the correlation is .332. This difference would not be the same however with a test such as Opposites because this test largely depends upon discrimination of meaning. This is an example of only one of the many confusing factors which enter into problems of mental efficiency and which demonstrate the necessity of differentiating between tests success in which depends upon level of intelligence and tests which are more dependent upon other factors.

The tests having the lowest correlations with Vocabulary among verbal tests are Analogies and Number Completion. These tests require both the apprehension of new data and thinking in situations in which habit has slight effect. They cannot be used alone to measure Level in either the normal or the pathological groups since it would be impossible to estimate the influence of mental efficiency on the scores without the use of a more stable constant.

Pathological Group:

Among pathological subjects correlations of all phases of mental efficiency with Level are lower than they are in the normal group. This is also true of the verbal tests. The greatest differences below normal correlations are with Easy A, Motor A, and Motor B. These are probably more affected by mental malfunctioning than the others. The lowest correlations are with Motor B, Easy A, Easy B, and Motor A. These probably vary most among the malfunctioning types studied.

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Correlations with Total Efficiency: Normal Subjects:

The Total Efficiency score includes the test groups which are correlated with it, the purpose being to determine which groups of tests contribute most to the total. The correlations are shown in Table XLII-B.

The tests which are the most highly correlated with Total Efficiency are Easy Continuous, Initial Learning, and Warming Up. These are tests which are very dependent upon speed of associations as an aid to perception and learning.

Pathological Subjects:

The coefficients of correlation between Total Efficiency and test groupings do not differ from the correlations shown by the normal group as much as they did for Vocabulary. The test groupings which have the highest correlations with Total Efficiency are: Learning, Initial Learning, Easy Continuous, and Warming Up.

The greatest increase over the correlations shown in the normal group are in Easy B, Learning, and Initial Learning. These tests are probably the ones most closely related to efficiency of functioning among all the types of pathological subjects considered. The greatest variability, judging from the degree that correlations are lower than in the normal group, are in Motor tests and in the Easy A groups.

Implications of Results Limited to Border-Functioning Groups:

Inferences drawn from the border-functioning group of subjects who are not greatly impaired can not be applied to other subjects who are greatly deteriorated. Work which can be performed easily and almost automatically may be little affected until malfunctioning is so great that even ability to work with familiar data begins to fail. Persons

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who are greatly deteriorated lose fundamental capacities which are essential to functioning in all phases. They can no longer abstract and reason, not because they have suddenly lost these capacities, but because the gradual loss of the necessary fundamentals is so great that the data with which to reason cannot be kept in mind so as to become effective. In such cases all functions score lower and more nearly evenly. The result is that correlations with Level differ according to the range of inefficiency and the range of Levels that can be reliably measured. It is only when degrees of impairment are practically equal that different types of subjects can be compared as to differences in mental efficiency. When it is impossible to estimate the degrees of impairment the functioning of different groups of pathological subjects can be compared by equating efficiency scores and scholastic records.

Implications of Studies of Test Groupings:

Not only are correlations different in their implications according to the stages of impairment, but they also differ according to the clinical groups studied, according to age range, and according to the number and kind of tests grouped together. These considerations show the necessity of studying separate tests and test groupings with persons of different ages as well as of different functioning types and different intellectual levels. The fact that increase in median scores is unequal between different levels of intelligence and that some scores change consistently from Level to Level while other scores remain practically the same for several different year ranges in succession makes it evident that there is little chance of deriving significance from tests which have been arbitrarily chosen and named unless each test and each sub-test has been studied in relation to a measure of intellectual level which is practically constant.

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The high correlations of some groups of tests with Total Efficiency do not justify their use in place of the efficiency battery. The validity of such substitutions can be determined only by a study of each test or test group in relation to capacity for normal adjustment and in relation to the degree of impairment of other factors. By accepted statistical standards, each group of tests could be proved to be a valid measure of mental functioning since all are ultimately lowered in malfunctioning and since any one factor affects the functioning of the others. Slow perception affects recall and indirectly affects judgment. Quick associations facilitate learning unless associations are so quick as to prevent the selection of items pertinent to controlled learning. Slow mental functioning affects motor efficiency, although it does not necessarily affect motor control. However, these close interrelations do not make any score for groups of tests a basis for prediction about other group scores in work with border or doubtful cases.

CHAPTER VIII

POSSIBILITIES OF A MORE QUANTITATIVE METHOD IN PSYCHOLOGICAL ANALYSIS

Comparison of Normal and Pathological Subjects in Different Phases of Mental Functioning:

The most striking result from the correlations is their lack of meaning when there is no exact knowledge about the nature of separate tests or about the condition of the individuals who make the scores. This situation can be changed only when statistical work is more standardized as to necessary procedures in all studies. Correlations should also be known between scores on different well-standardized tests and scores made both by homogeneous groups and by persons who represent a wide range of intelligence. It will also be necessary to know what interference is to be expected from groups which are atypical as to efficiency of functioning.

Mental Profiles:

When, instead of considering correlations we consider the scores made by different types of subjects, we find substantial and reliable differences between those of the normal and pathological groups.

Graph I¹, which is made up from median scores for verbal and efficiency tests, shows the mental profiles of seven classifications of subjects who are all of the same vocabulary level. The greatest deviations below normal medians are in Repetition C, Warming Up, Incidental Learning — the mean-

1) See Appendix.

ing of this grouping is not clear and more study is being done with it — and Easy B. In Easy B the subjects diagnosed as definitely pathological tend to score more nearly alike while they deviate greatly from each other in other test groupings. Scores on the verbal tests in which timing is important drop more but they show wide differences between the different clinically diagnosed subjects.

Though the general impression conveyed by the graph is that the impairment shown by the different clinical groups is much alike, and that the different types tend to be good or poor in the same functions, distinctive differences are evident in these border-functioning groups. Study of their scores shows that they tend to differ from normal scores both in pattern and in degree of scatter according to their different classifications. The range of median scores of the normal group is only about 1.4 years. The vocational group tends to be particularly poor in speed of motor movements but is practically normal in other phases of functioning. The psychoneurotics are closely related to the type of functioning shown by dementia praecox patients but they are quicker in perception as shown in the second group of easy tests. The three dementia praecox types show similar profiles but they deviate considerably in easy continuous work, in warming up to work, in the repetition tests which require the adoption of a method.

Pairing Method:

Table XLIII shows median deviations of different scores from norms as found by pairing normal and pathological subjects as to both age and level. The differences found strengthen the proof of the reliability of the results revealed when deviations from normal medians were studied.

TABLE XLIII

Median Deviations from Normal Scores: Pairing Method

| Diagnosis | EI ¹ | Poorest ² | Best ³ | Repetition | | | Repetition | | |
|--------------------------|-----------------|----------------------|-------------------|------------|------------------|--------|------------|---------|---------|
| | | | | B | Initial Learning | Easy B | C | Motor A | Motor B |
| Normal | 0.0 | | | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Normal Q1 | -1.0 | Repetition C | Easy B | -2.0 | -1.7 | -1.4 | -2.0 | -1.4 | -0.8 |
| Clinic A | -1.0 | Motor A | Easy B | -0.3 | -0.3 | -0.5 | 0.0 | -1.5 | -2.4 |
| Clinic B | -2.2 | Initial Learning | Easy B | 0.0 | -5.3 | -1.3 | -4.0 | -2.7 | -3.5 |
| Psychoneurotic | -1.2 | Learning | Repetition B | -1.0 | -1.5 | -2.4 | -2.0 | -2.4 | -1.7 |
| Psychopathic Personality | -1.9 | Motor B | Repetition B | -0.5 | -1.6 | -1.7 | -1.0 | -3.0 | -3.2 |
| Institutional | | | | | | | | | |
| Simple Praecox | -2.7 | Easy B | Repetition B | -1.5 | -3.6 | -4.0 | -3.5 | -3.4 | -3.2 |
| Catatonic | -3.0 | Motor B | Learning | -2.5 | -3.7 | -2.0 | -4.0 | -3.9 | -4.5 |
| Manic Depressive | -3.1 | Motor B | Repetition B | -2.7 | -3.9 | -2.5 | -4.7 | -5.3 | -6.4 |
| Paranoid | -3.3 | Initial Learning | Repetition B | -1.0 | -4.2 | -3.0 | -3.0 | -4.0 | -4.0 |
| Hebephrenic | -3.6 | Initial Learning | Repetition B | -1.7 | -4.7 | -3.0 | -4.2 | -4.0 | -4.2 |
| Organic | -4.1 | Warming Up | Easy A | -4.0 | -6.0 | -6.0 | -4.6 | -4.9 | -5.8 |

1) Deviation from norm in total efficiency.

2) Test group in which score is poorest.

3) Test group in which score is best.

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The normal median, which was taken as the point from which to measure efficiency, is represented by zero differences. This is followed by the Q^1 of the normal group of subjects. These vary since quartile points differ according to the kind of tests.

Clinic Groups:

Clinic Group A has no history of maladjustment except that of needing work. Many of this group have normal or excellent efficiency. But the scores suggest that even in hard times, or especially in hard times, need of work is a selective factor, which affects a relatively large number of persons of poor mental functioning. This group shows a special handicap in motor tests though it shows quick perception and normal learning ability.

Clinic Group B is the group which has a history of poor adjustment as shown either by previous hospitalization or by private medical diagnosis. Some were merely reported as being no longer *en rapport* with their physicians and unable to profit from further psychical explorations. This group of persons shows a tendency to greater unevenness of ability than does the preceding group. The group profile suggests that most paroled patients are so poor in mental functioning as to experience difficulty in adjusting without the aid of special psychological analysis and understanding. They differ from definitely recognized pathological groups by the normality of their responses to easy tests. They show a normal repetition span, pathologically slow capacity to integrate and learn data, but good fixation of what is learned.

Psychoneurotics:

The psychoneurotic group shows a generally unfavorable but fairly even difference from the scores of normal subjects. However, except for the repetition tests the whole range of

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median scores is below the first quartiles of scores made by the normal group. The psychoneurotics tend to be poorest in the second group of easy tests, in learning, and in motor tests which demand learned responses. Their memory fixation is much below their initial learning. This is in contrast with the group from the clinic which slowly continues to integrate the data of learning tests and which is practically normal in the fixation phase of learning. The ability of the psychoneurotic subjects to have normal repetition spans with their marked incapacity to integrate and learn the data is similar to that of the mild dementia praecox condition but is less in degree of deviation from norms. Though they are very slow in motor tests which require learned motor habits, they manifest fair speed in discrete motor movements.

Psychopathic Personality:

The psychopathic personality group tends to have normal memory spans with slow learning and poor fixation of what is learned. They are distinguished from the psychoneurotics by their better learning ability and by their poorer response to motor tests, which show great retardation in speed of separate easy movements. This is evidently not a learning defect due to incapacity to get motor habits but a definite defect in speed of discrete movements.

Simple Dementia Praecox:

The simple praecox group tends to score above the first quartile of normal scores on repetition tests, but is extremely poor, although rather evenly so, in all the other test groupings. In learning they show fair fixation of what is learned on first trial. This group shows the typical mild dementia praecox profile of high memory span relative to learning, and retardation in response to the questions of Easy B.

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Catatonic Dementia Praecox:

The catatonic group stands out from the other praecox groups in that, with a shorter span and slow learning, there is better fixation of what is learned. Like the psychopathic personality, only to greater degree, there is special defect in the speed of discrete motor responses.

Manic-Depressive:

Manic-depressive patients show the greatest loss in the different functions of any of the border groups studied. Scores run from 2.7 to 2.8 below the median scores of the normal group in repetition tests and Easy B to 6.4 below in motor tests. Manic-depressive patients show slow learning with good fixation of what is learned. A distinctive difference between the manic-depressive and dementia praecox groups is in their more nearly normal scores and therefore their relatively quicker perception on the easy tests.

Paranoid and Hebephrenic Groups:

Paranoid and hebephrenic patients are much alike in the relations between the test groupings though hebephrenic subjects seem to be poorer in easy continuous work, as well as in first trials of learning and in the repetition tests which require the application of a method. Both groups show retarded learning with relatively good fixation which indicates that weakness lies primarily in the time needed for perception and the necessary inner activity. The learning defect is distinctively different from that found in senility and in many cases of definite organic impairment in which fixation of the amount first learned is even poorer than the amount recalled for immediate reproduction.

Organic:

Organic cases score farthest below normal, a fact which corroborates other findings as to underlying organic brain

pathology. They show a greater evenness in the profile of mental factors than is shown by the border pathological groups. With the organic cases the mental defect has affected even the simple capacity to repeat meaningless sounds so that there is no longer the contrast between repetition and other kinds of response.

The facts that scores of pathological subjects are generally lower than scores of normal persons in all phases requiring mental control, and that in spite of willingness and effort pathological subjects are incapable of improving the efficiency of their mental functioning, are in agreement with Roback's² failure to find any proof that a greater amount of work can be accomplished by a greater concentration of attention. They also throw light on the cause of his results. This is of great significance in education, indicating as it does the great importance of methods and interests and habits; since intellectual potentialities and their functioning can be little changed.

Summary of Comparisons:

These comparisons suggest future possibilities. That the relations are generally reliable has been shown by fair agreement between comparisons at different vocabulary levels. Praecox patients of the border-functioning group show a pattern of scatter that is different from the normal or the clinical groups in the span-learning ratio. The catatonic group stands out from the others by having poorer spans associated with better fixation of learning and by making definitely slower discrete motor responses. The manic-depressive group shows normal but slow learning relative to span. Their scores on Easy B, which are nearly within normal limits, serve to distinguish them from the praecox types,

² Roback, A. A., "The Interference of Will Impulses," *Psychol. Monog.*, Vol. XXV, No. 5, 1918.

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while motor responses are slower than those of any of the other groups including the organic.

All of the groups show relatively high repetition spans, though they are below normal. This is in agreement with what is to be expected in mental impairment — that abilities first developed in man and in the individual are the last to be lost. In this border group the primary physiological functions and speech habits are normal. Repetition tests — digit and sentence repetition spans — which score highest in all groups, are based on a trait far back in ontogenetic development, the tendency to repeat and to imitate even when the data so repeated are meaningless. In these tests, the words repeated have been familiar from early childhood. Used alone, they are not necessarily signs of present mental functioning except at very low levels of intelligence. They can be interpreted only as they are related to other abilities.

Aside from the repetitive ability, the likeness in the mental capacities of patients at equivalent degrees of impairment is striking. In all groups of tests, ability to do something which requires concentration and which cannot be done by dependence upon old habits, as in the Knox Cube-Reversed Digits group, scores the lowest. The next lowest is Warming Up, which depends especially upon speed of perception and starting time. Next are the first trials in learning tests but not the learning. After these are tests of fixation and recall which vary much more among the different clinical groups, and which on the whole are not as much below normal scores as are first trials of learning. These findings offer further proof of the thesis that the defect is in tempo rather than in memory, particularly in perception time, which is the first phase to become pathological and which then indirectly affects learning. Finally, because of the effects of such pathological timing, there is a lack of

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mental organization in general which offers no hope of normal contacts with the outside world.

While normal persons differ in the efficiency of different phases of mental functioning, it is within a more limited range of variation. Mildly pathological patients, whose mental defects have not been suspected and who have never been committed to institutions, are apt to show greater unevenness of functioning than other groups.

Psychological Analysis of a Case of Very Uneven Functioning:

Graph II³ shows the mental profile of such a case (*B*) compared with norms for a person of her level and also with efficiency scores of three persons of low intellectual level — one a mentally deficient adult and two children of 10 CA, who make good social and vocational adjustment and whose total efficiency score is the same as that of *B*. *B* has a very superior level of potential intelligence which had never been adequately measured and analyzed. She could easily do the abstract-verbal tests of the Terman-Merrill Examination. Her obtained mental age was 16 years, 7 months. She scored 19 years on the abstract verbal parts, and 14 years, 11 months on the parts which depend more on the apprehension of new data. Her Otis score was 13 years, 10 months. The irregularity shown in her level-efficiency profile also showed in clerical and MacQuarrie tests. The parts which are more dependent upon efficiency of functioning scored only at the ten-year level. Teachers had never been able to understand her because of her ready comprehension of intellectual work of a kind that average children of her class could not grasp, and her failure to be able to follow simple directions and to do routine things as well as other children. Non-coöperativeness or stubbornness were the usual explanations. One striking trait was that if she did not immediately grasp an idea or think of an answer, she knew nothing to do about it.

3) See Appendix.

She used her innate capacity spontaneously, after having spent twenty years in slowly learning the use of the tools of thought, but had no idea of anything to do in a new situation, which required some plan or method. She particularly enjoyed such a mental exercise as matching proverbs. Her quality of functioning shows that she can probably never adjust as a normal person although if we consider only her total efficiency, it is as high as that of certain mentally deficient persons who make good adjustment.

The most striking aspect of the profile is the degree to which it overlaps both the superior and inferior groups. She scores higher than superior subjects in some verbal tests and scores lower than the subjects of low level in *Initial Learning and Motor Speed*. Although her scores are high on verbal tests, they are of a kind which a person of superior level with good language habits can easily do, even when there is great mental impairment. The analogies and number completion tests, however, which require mental clearness and the holding in mind of different ideas while words or numbers are being considered, score only at about the level at which persons of low intelligence may make chance scores. In doing these, she shows a lack of capacity to consider and evaluate new details. Her best functioning score, which is in easy continuous work, is not affected by perception and starting time. She is an outstanding example of very superior native scholastic potentiality with pathological mental functioning.

Lack of Evidence of Psychogenic Psychoses:

Our studies do not reveal any evidence of such a phenomenon as a psychogenic psychosis. Though many symptoms may be exaggerated by environmental stress and strain, there is as yet no validated study to prove that bad mental habits or any of the mental mechanisms often cited lead to insanity or mental deterioration. This belief has been fos-

tered by those who enter the field of psychology via medical or psychoanalytical routes, but who lack a fundamental training in psychology itself.

Statistical results of scientifically determined scores indicate that coöperative border subjects evince all degrees of malfunctioning from that of recognized organic cases, who are most mentally impaired in general, through psychotic manifestations, the peculiarities of dementia praecox, the alleged psychogenic psychoses, institutional paroled cases, non-institutional clinical cases with a history of maladjustment, to the normally adjusting population.

The overlapping of clinical types both in general mental functioning, and in the different phases, indicates that a nomenclature for the purpose of separating them into different clinical groups is impracticable. It is probable that different combinations of weaknesses such as the catatonic and manic-depressive syndromes will in time be associated with different known causes or with more definite localization of impaired mental processes. However, except for some localized, organically-caused incapacities and in spite of the unevenness of mental functioning in much mild impairment, mental impairment is general rather than specific. The studies indicate that when there is a localized disease or when the mental condition is probably due to general neuro-physical weakness, the determination of the relations of different functioning phases to norms and to each other should be extended so as to include other groupings of abilities and even some of the single test abilities.

The results of a psychological analysis should be similar to medical reports of generally poor physical condition in which blood counts, blood pressure, and the conditions of the various organs are considered separately as well as in their relation to the whole. It is evident that neither apparent normality nor a moderately low efficiency score justifies

an assumption that there is no special weakness to handicap the functioning of otherwise normal capacities. Just as medical diagnosis ascertains the weak organs, the wrong chemistry, and the presence of any toxic condition; and just as physicians are not satisfied with such diagnostic pronouncements as "poor health" and "probably of bacterial origin" without trying to learn the cause of the poor health or the species of bacteria; so persons working in pathological psychology could do better work in dealing with human minds if, instead of being content with vague descriptions or with such unvalidated and meaningless conclusions as that a patient shows evidence of a split personality or of a struggle between the life and death principle, they determined the condition of the different mental factors involved which are the primary cause of such diagnoses.

Importance of Psychological Analysis:

We can get information as to a person's educability or trainability by learning the degree of mental functioning both in general and in the different phases, by determining whether there is a pathological relation between span and learning, and by finding out whether or not motor speed is too slow for normal competition and success. All of this is more scientific than the application of a name to a condition which has never been defined with any degree of clearness. Even the question of whether or not trouble is organic in origin is useless, after the medical profession has done all it can, since all the pathological mental conditions are probably primarily somatic in origin and to some degree are organic. The important question concerns the degree of malfunctioning, and whether it is growing worse or better. Even to know the location and the extent of a pathological condition would not be enlightening about the mental condition without special psychological analysis.

Knowledge of the functional aspects of mental activity has lagged far behind our conception of intellectual level. Ideas about extremely impaired mental conditions are still not very unlike those in regard to intelligence before the places of the moron and borderline intellect on the curve of distribution for intelligence were known. The border-functioning group fills a similar gap between the mentally stable and the insane; while truly insane functioning is below the lower end of the normal curve of distribution for mental efficiency. It is to the intermediate group — persons who have all their mental capacities in some degree and who can still give indications of their innate capacity to abstract and reason even though it may be with difficulty — that we must look for understanding of the normally functioning mind, rather than to persons who are extremely deteriorated and who have lost all controlled contact with the outside world.

CHAPTER IX

IMPLICATIONS OF THE RESULTS OF THE LEVEL-EFFICIENCY THEORY

Mental Deterioration and Mental Functioning:

With increasing understanding of the problems involved, the type of mental examination, planned to measure degrees of mental deterioration and later extended to include alleged psychogenic disorders and normal mental characteristics, has served to bring out the fact that the problem of *mental deterioration is part of the broader, more general problem of efficiency of mental functioning.*

Further Understanding Dependent Upon the Role of Time:

Experimental work, based on the hypothesis that the chief trouble in pathological mental conditions is in the time required for perception and appropriate response, has developed into the theory that the general factor of time is basic to normal mental functioning, and that better understanding of mental organization depends upon knowledge of the role of time in different phases of mental activity.

Mental Tempo and Intelligence:

In a normally functioning population, easy timed tests which do not make demands upon intellectual ability except at very low levels of comprehension, have been shown to have high correlations with level of intelligence. Since they show little relation to level of intelligence when they are not

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timed it follows that time must in some way be the cause of the correlations even though one of the arrays is not affected by time.

Mental Tempo and Normal Mental Functioning:

The correlation between mental efficiency and level of intelligence is lower in the pathological group than in the normal group. The lower correlations are partly attributable to inequality in degrees of mental impairment of the subjects. The fact that they are still high is due to the close relationship between mental tempo and intelligence.

Mental Tempo and Adjustment:

Though efficiency scores in the border-functioning group are higher at each higher level of intelligence they are lower at each corresponding level than are those of the normally functioning group. From this it is evident that the effects of time as shown by the efficiency battery are positively related to the normal functioning of intelligence. Persons who make good adjustment have good mental efficiency relative to their level, whereas persons of even high level of intelligence but poor efficiency are not normal according to social, vocational, and psychiatric criteria. Consequently it is evident that *there is a causal relation between time as shown in poor efficiency scores and lack of ability to make normal adjustment.*

Border-Functioning and Experience:

The decrease in efficiency scores with different recognized degrees of mental impairment indicates that persons of the border-functioning group are less efficient in the use they can make of the effects of past experience than are normal persons of equivalent mental level.

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Learning and Border-Functioning:

Among border-functioning subjects there is less capacity to learn data than among normally functioning subjects. Learning is diminished even though fixation and later recall of the amount learned may be normal. The defect in learning is seen to be a matter of mental tempo which manifests itself in generally retarded associative activity and slow perception.

Significance of the Relation Between Efficiency and Mental Level:

Normal persons of low intelligence may adjust well while persons of higher intelligence who make exactly the same score on the efficiency battery but whose scores are poorer relative to norms for their intelligence, do not adjust well. From this it is evident that *the relation of efficiency scores to level of intelligence has more significance for normal mental functioning than the score considered alone.*

Mental Profiles and Border-Functioning:

Persons in the border-functioning group who, while having normal ability to reason and generalize are abnormal in behavior, show greater discrepancies between the different phases of mental functioning than the normally adjusting population of equivalent mental levels. The mental factors which are nearest normal are those which make demands upon innate capacities and do not require the assimilation of new data and those which depend upon the oldest acquired learning. The greatest weakness is in the time required for response. In some cases this shows in retardation of apprehension and learning, and in other cases in slowness of that part of the mental process in which an idea is carried over into action. The responses which score the highest are the ones

which can be accomplished at low functioning levels or are untimed and highly correlated with mental level.

Significance of the Co-functioning of Different Mental Phases:

Correlations of the total efficiency score with mental level were higher than those which measure different phases of mental functioning. From this it is evident that *the relation of the different phases to each other and the way in which the different parts of the mental process function together are of greater significance than either the total score or the different phases considered separately*. They show that knowledge of the functioning of separate mental factors is meaningless as a basis for prediction and advice if the inter-relations with the other factors are not known, and that understanding of the human mind requires study of both its separate phases and of its functioning as a unified whole. Abnormal disparities between different phases of mental functioning also furnish clues to the problem of mental organization.

For example, although a superior vocabulary indicates potential capacity for scholastic work, it tells nothing about capacity for normal adjustment, since a person may be too unstable to use his correlative ability effectively. A long memory span is an asset only if the data can be normally integrated. It has been shown that certain pathological types have relatively long spans which seem to be merely auditory or visual images, and which play little part in their mental organization.

Without knowledge of the relations between different phases of mental functioning we could learn nothing of significance if we were told that a person had superior reasoning ability, low average learning ability, and very superior span and verbal comprehension. This gives an impression of being a good report since it apparently shows no definitely

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abnormal features. However, when we consider that a long memory span, associated with relatively poor learning and a high level of verbal comprehension, can only mean that a person does not normally integrate the data he hears, and when we consider that such a discrepancy is typical of mildly impaired mental conditions the report takes on a different meaning.

Efficiency Phases and General Efficiency:

A reason for the fact that a battery of tests which correlates highly with intelligence is more significant than its sub-tests lies not only in the fact that they have been selected so that each will emphasize some important factor but also because of the importance of the interrelations of the parts and because each part is essential to the functioning of the whole.

Three Contrasting Types of Mental Functioning:

The interrelations of the parts are different for different types of functional efficiency and of personality.

Graph III¹ shows a psychological analysis of three persons who are typical of three types of functioning. A and B are of practically the same level of intelligence and the same general functional efficiency. These are compared with the mental profile of a person of the same level of intelligence whose efficiency score is at the norm.

A belongs to a type which is the more readily recognized in states of mild mental impairment. He functions very slowly and shows long memory spans with poor learning ability.

B functions too quickly and shows poor memory span with relatively good learning ability. This quick functioning often gives a false impression however, since concentration and controlled thinking may be poor. When such a

1) See Appendix.

condition is slightly increased and speed can no longer compensate for poor concentration, mental efficiency becomes even poorer than in the slow group, because associative activity is too quick for the functioning of pertinent ideas. Such persons tend to be impulsive and arrive at conclusions too quickly. Responses which seem to indicate alert quick thinking are often merely quickness in the functioning of old speech habits.

C has better efficiency in general than A or B, but he shows marked weakness in the easy group of tests, which has been found to be typical of the mild dementia praecox syndrome. C also makes extremely poor scores on motor tests. This is an example of the kind of malfunctioning which escapes notice in its early stages when it is mild and is associated with superior intelligence, clear thinking, and good learning capacity.

Mental Efficiency and the Bernreuter Questionnaire:

The efficiency aspect as a basic factor in personality permits finer discrimination than the differentiating signs which have resulted from observation of external behavior and which are affected by the unisolated factors of intelligence and efficiency of functioning.

A relation between mental efficiency and personality is also shown in the more subjective Bernreuter Personality Inventory.² Extremely poor or good efficiency scores have been shown to be fundamental to indications of extremes in personality ratings and they are probably one of the underlying causes of personality differences. Extremes of dominance, confidence, and extroversion, are positively related to extremely high efficiency scores, while extremes of submission and neuroticism are related to very low efficiency scores.

2) Babcock, H., "Personality and Efficiency of Mental Functioning," *Am. Journ. Orthopsychiat.*, 1940, vol. X, No. 3.

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This is in agreement with the neurological findings that such differences in psychological types are due to exaggerated cortical excitability and cortical inhibition. However, "inhibition" as a causal factor in the functioning of the slower type somewhat distorts the true condition which is probably due to uncontrollable retardation or even temporary cessation of cortical activity. There is evidence of a lack of capacity for activity rather than inhibition. If one is walking and inhibits his movements because of danger ahead, his action is quite different from that of a person who is scarcely able to walk at all.

Study of Individuals an Essential in Psychology:

Since psychology concerns individuals whose behavior is affected by the *interrelations* and combinations of different capacities, it follows that methods of research, which emphasize statistical techniques appropriate to study of groups and which are done without sufficient knowledge of individual psychology or subsequent consideration of the effects of individual differences on the results, are necessarily inadequate. Faith in the belief that illuminating ideas will emerge from statistical machines, without sufficient understanding of what is put into them, helps account for some of the contradictory results obtained by various research workers.

In the present investigations, it was found that for all pathological subjects correlations between efficiency of functioning and level of intelligence were undependable and useless for predictive purposes because correlations could not include scores of subjects of the poorest mental functioning since there was no way of determining their approximate level. Also correlations give no clues to the degree of malfunctioning. It was therefore evident that significant facts can emerge only from measuring the mental capacities of *in-*

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dividuals by tests which are weighted in the same way and are scored in units which are readily comparable. *Mental activity* occurs only in *individuals* who use all their mental factors though with varying degrees of efficiency and at different levels of comprehension.

Intelligence Tests:

It is because little can be learned from separate measures of different mental factors unless we know their interrelations as shown by normal individuals, that a well-standardized intelligence test has a great advantage over the work of the usual psychological laboratory, which is apt to give results of questionable value for the understanding of mental organization and problems of human adjustment. To assume that measures of separate mental factors make tests of general intelligence obsolete is to ignore the fact that any test demands the functioning of all underlying mental factors though in varying degrees, and that it is impossible to choose tests of only one functioning unit. It also ignores the fact that tests which are easily understood at a lower level than that of the group measured do not indicate differences in intelligence to the extent that they measure differences in efficiency of functioning. It further ignores the necessity of knowing the level of intelligence of the subjects and of using as a constant to evaluate test results a measuring instrument which is not affected by mental efficiency. It particularly overlooks the necessity of knowing the normal relations of the parts to each other as well as the results of individual scores on the combined tests.

Normal Functioning and Apperceptive Background:

Besides the importance of the relationship between the normal functioning of intelligence and the time factor, the fact that normal persons of high intelligence have higher

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efficiency scores than those of low intelligence indicates the dependence of effective intelligence upon the normal functioning of the effects of past experience at different degrees of awareness according to the requirements of an idea or problem.

Impaired Functioning and Apperceptive Background:

The decrease of efficiency scores with recognized degrees of impairment indicates that persons of the border-functioning group are less efficient in the use they can make of the effects of past experience than are normal persons of equivalent mental level. The better efficiency of the normally functioning group is due to the relegation of more underlying propaedeutic activity to unawareness. This accounts for the increasing promptness and efficiency of the normal group. It indicates that the *normal functioning of increasingly higher intellectual potentialities depends upon an apperceptive background which has been gradually acquired through the interaction of native capacity and experience, and can be used with varying degrees of awareness* according to the demands of a particular problem as well as according to level of intelligence. As a consequence persons of higher intelligence can perform with little concentration and awareness familiar practised functions which are understood but performed less readily by persons of inferior intelligence. While mental growth is concomitant with the acquisition of an apperceptive background, in mental impairment there is both decreased ability to add to the apperceptive background, and inefficiency in the use of what has already been acquired.

New Light on the Course of Mental Impairment:

The results are in general agreement with the recognized law of mental deterioration that the effects of the

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oldest learning are the last to be lost. They also threw light on the earliest stages of mental impairment by bringing out the fact that the first stage is marked by poor synchronization of the different mental phases. This was revealed either in too slow mental activity which permitted an idea of a problem to fade before it could affect a sufficient number of appropriate associations, or in such quick functioning that associations were not pertinent to the main idea. In both cases the mental weakness was in the inability to control the use of suitable data.

Educational Implications:

The ready functioning of the effects of past experiences which are integrated with the effects of other past experiences and learned habits of thought from simple perception to the most complex generalizations, frees the mind so that it can think in units of greater complexity. Systems of education which deprive children of an opportunity to gain a foundation of factual knowledge and to acquire habits which will later be useful and lack of which will be a handicap, are analogous to a type of training which would permit a child to choose its own food and not insist upon its having a proper diet. It has been learned that if a child does not willingly take proper food a way must be found to make him. It should be the same in education. There are certain things which everyone should know and certain training which everyone should have. It is the failure of modern educational methods to realize the value of a foundation of well-integrated knowledge and well-fixed habits of careful thinking which has contributed to the failure of many highly endowed students to function effectively in society.

The Unconscious in Education:

The unconscious is the result of the effects of past ex-

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periences which have become integrated with the effects of other past experiences during moments of varying degrees of consciousness. In education the value of the unconscious — not absolute unconsciousness as in death or stupor, but very low degrees of awareness — is incontrovertible. Learned multiplication tables, good manners, and habits of clear thinking and expression save time for the more complex and unusual work of the mind. Even the validity of judgment depends upon the functioning of past data pertinent to the subject to be judged since it would be impossible to assimilate necessary knowledge on each new occasion. Also the development of a normally functioning superior intelligence would be impossible without a basis of experience and learning which has its effects upon subsequent experience.

The unconscious is both a consequence of the activity of the normal mind and its most indispensable servant, since the mind cannot function normally in the social setting without the fruits of its own creation. Appreciation of the nature of man's unconscious functioning shows why laissez-faire methods in education are unsound. Such methods have been the natural result of failure to appreciate the significance of a well integrated apperceptive foundation of mental organization and of failure to see the dangers which lurk in methods that leave students without a well organized background of knowledge and of mental habits. It also throws light on the vagaries of many popular movements and particularly the weakness in the "youth movement" since the very word "youth" implies that there has not been time for that richness of experience the assimilation of which is an essential basis for soundness of judgment and reasoning.

The True Self Not Revealed in Pathological Conditions:

The better use of the underlying apperceptive back-

ground in normal mental functioning and its impaired use in border pathological states, suggests that when in pathological conditions it is naïvely assumed that the unconscious has taken control and that a person's "true self" is at last emerging, the real trouble is in weakness of mental functioning. Because of this the self which has gradually been evolved through the years has difficulty in making normal use of its functionable past so as to produce appropriate responses. It is also evident that peculiarities of behavior which in cases of extreme mental impairment are often attributed to purposeful activity are of little significance since the true personality which has gradually developed during the life span is no longer functioning. Activity under such conditions is more neurological than mental and from the psychological viewpoint it is practically meaningless.

Mental functioning becomes pathological when the background of learned habits is no longer used and when the distinctively human part in mental activity cannot control and make normal use of its experiences. The characteristic of pathological mental states is not a resurgence of the kind of mental activity which man has in common with lower animals, but *lack of capacity of the higher more lately evolved mental abilities to function and to control the mind's activities.*

Mental Impairment Diffuse:

Considering the statistical results in relation to such work as that of Lashley,³ which shows the inertia effects of organic brain conditions, it would seem that when we find similar though less pronounced inertia effects in the intermediate stages of impairment, we might logically conclude that there is probably some brain defect which although not mani-

3) Lashley, K. S., "Mass Action in Cerebral Function," *Science*, 1921, vol. 73.

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fested by gross lesions or any known organic disease, may be due to cerebral weakness of some kind; as one might have a weak muscular condition with no discoverable disease of the muscles.

Our results are in agreement with those of Hart and Spearman⁴ in showing that mental impairment is diffuse, and that all mental phases are affected in severe pathological conditions. Mild border-functioning conditions, however, do not involve a lowering of the whole intellectual level. They merely show *slower* or more poorly controlled functioning in some or all mental phases. There are persons whose intellect and insight are well preserved long after mental efficiency is so impaired that normal adjustment is impossible. Even though all mental functioning is eventually affected in mentally impaired states, the mental inefficiency of the maladjusted border group is not *primarily* due to weakness in the abstract reasoning phase.

The Insane Qualitatively Different from Normal:

As we have seen, time in mental activity, especially in its relation to mental pathology, is not a matter of speed or retardation as measured from a fixed norm, but is a matter of relative time. However, readily recognized insanity and deterioration, which were the only kinds of mental pathology dealt with before the intermediate group was identified and for whom adjustment is impossible, do not fit into any time category. Insane persons are outside of time. Their mental efficiency is below the lowest part of the distribution curve of mental efficiency of the examinable pathological group. They can no longer apprehend problems or control their responses; and when they are quick, their speed is not true *mental* speed, but rather speed in automatic activity which

4) Hart, B. and Spearman, C., "Mental Tests of Dementia," *Journ. Abn. Psychol.*, 1914, No. 8.

is not controlled by the meaning of a stimulus in a definite context. The early common sense belief is probably close to the facts. The insane are a group apart, a group mentally different from normal. Although their state may have been reached by slow degrees, at some time there was a change from a quantitative to a qualitative aspect, so that the resultant condition was as different from the normal mind as ice is from water.

Separate Mental Factors Meaningless:

According to the Level-Efficiency theory, analysis of tests into factors such as verbal ability, fluency, or numerical ability is meaningless unless the level at which one can understand words and numbers and the level at which one can be fluent are known. Verbal fluency is a result of the efficiency phase of verbal understanding. A person may be fluent at an object-name level and not be able to extract the essential meaning from several associated words or from several usages of the same word. He may be unable to grasp the meaning of a word like "southern" because the concept for which it stands lacks concrete form. There are many fluent talkers who lack ability to discriminate and reason. Often there is real fluency in profanity, but it is usually executed at a very low level of mental ability and shows little evidence of a high level of capacity to discriminate meaning.

The same is true of numerical ability. It is frequently forgotten that numbers are merely symbols used for certain mental operations and that there are all levels of number interest and of efficiency in the use of tools which give it expression. Morons, who cannot understand the essentials of sixth grade arithmetic, often prefer number work because they have achieved efficiency and speed in learned responses at the level of difficulty they can understand. The correla-

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tion between verbal and numerical ability would probably be very high except for the fact that most of the population does not continue practice in the use of numbers beyond the requirements of fifth or sixth-grade school work, while most persons of much higher intelligence stop using numbers except in very simple operations unless they specialize in mathematics. Also, tests which use numbers alone are seldom carefully standardized over a wide range of ability and many of the tests which are used cannot be understood by persons of below-average intelligence. These facts tend to affect correlations in unknown ways.

The confusion caused by the results of many statistical studies has shown the mistake of not using the human heritage of ability to observe and reason, and of expecting to learn the facts of mental organization without some basic theory and a foundation of broad experience as a guide. Statistical analyses have been too much concerned with the kind of symbols used and have had too little regard for corresponding mental processes which are the essential parts of the mental units represented by the symbols. Instead of being principally concerned with symbols, psychology should concentrate on the kind of mental activity which takes place between stimulus and response, whether it be simple association, recognition, inference, generalization, or the performance of mental acts which require very complex units.

Level of Mental Development the Important Consideration:

None of the statistically disclosed factors have proved of much value in interpreting mental activity. In fact, work with individuals does not disclose factors which distinguish human beings from one another. Everyone has memory. It functions in all phases of mental activity. It is essential to any perception. Without memory no comparison or generalization could be made. All persons can use num-

bers to some degree of complexity and meaning. And all reason in varying degrees, from the practically unconscious reasoning of the infant who deduces from past experience that the pleasing sensation of food will follow certain events which he recognizes, to the increasingly more conscious and less concrete forms of reasoning.

Except for different combinations of sensory acuteness and motor skill which result in special aptitudes, little advantage is to be gained by looking for factors which probably function in all normal persons from early childhood, and which differ among individuals only in degree and in the variety of their combinations, and in the complexity of the units which can be immediately perceived and used.

Since there can be verbal ability at very low levels, the term is not enlightening as a special factor, even though it may be important as a trait which distinguishes human animals from other animals. Since the phases of intelligence are not independent and do not function in the same degrees, and since they are all affected by the ability to abstract and generalize, the important consideration in mental organization is not verbal ability in general but the *level of development of the mental processes for which the verbal symbols stand.*

Intelligence as a General Factor:

Whether to think of intelligence as a matter of the functioning of one factor or of many depends upon whether we begin with the lower animals who, like human beings, have ability to perceive and remember though they lack a means of symbolic expression; or whether we start with human beings and consider perception and memory, together with the condition of the body and the nervous system as merely propaedeutic to the functioning of human intelligence but not as its essential or distinguishing characteristic. Pure

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ability to learn and fixate data probably does not distinguish human beings from other animals or differ much between human beings of different levels of intelligence. However, there are more kinds of data which human beings can perceive than other animals can, and the quality increases with corresponding increase of intelligence. Though capacity for certain kinds of learning, which are facilitated by the processes of comparing and generalizing does increase with higher intelligence, this is not so much pure learning as it is the result of insight and methods used. Persons tend to perceive, remember, and show interest in the kind of thing they are *capable of understanding*, that is, they naturally attend to the kind of data to which their organ of intelligence and their special abilities make them sensitive. It is occasionally intimated that some animal is "not unintelligent" and that he is merely "not interested," when the true reason for his lack of interest is that he does not have the kind of organs which would make it possible to perceive the things in regard to which he is assumed to be intelligent though inexpressive.

Abstract and Concrete Intelligence:

According to the present view of mental organization there is no fundamental difference in kind between abstract and concrete intelligence. Both necessitate abstraction and reasoning. For example, when an object is seen as a sphere, the visual sensation is not a sphere. There has been a quick act of reasoning which was unconsciously performed because of familiarity with such phenomena. Similar light and shade in the past have invariably meant solidity rather than a flat surface; therefore the object is probably spherical. The art of camouflage relies on this unconscious reasoning, a kind that is performed constantly in everyday life and which is a necessary foundation for normal functioning and

adjustment. At higher levels of intelligence there is more comparing and reasoning with implicit verbal response than is generally realized.

The reason that mentally impaired persons react more readily to the concrete is because attention to what is present to the senses is among the earliest appearing and most practised capacities and is among the last to fail in general mental impairment. To be able to react adequately to the concrete is gradually lost in such cases, because of incapacity to interpret by means of the effects of past experiences.

Completion of the Distribution Curve of Mental Efficiency:

By showing the place of the psychogenic psychoses in the distribution of mental efficiency between normal functioning and extremely impaired mental conditions, all mental functioning — normal, border, and extremely deteriorated — is brought together under one inclusive concept and shown to be subject to the same psychological laws. This brings into the realm of science a field which has long been open to speculation, and which has in turn been the cause of much questionable practice based on unvalidated concepts and dubious interpretations.

Classifications and Psychological Analysis:

Recognition of the importance of unaware functioning in normal mental activity, and knowledge of the nature of mental inefficiency in mildly impaired persons, weaken many prevalent beliefs as to the psychogenic cause of border-functioning conditions. Mental profiles which show different mental phases have made it evident that distinctions between psychopathic and other pathological mental conditions are the results of differences in combinations and degrees of efficiency of different functioning phases, and that such terms as neurotic, psychopathic personality, dementia

Implications of the Level-Efficiency Results

praecox and all classifications based on observations of superficial behavior are useless and probably obsolete and must give way to more scientific definition. Different malfunctioning phases do, however, tend to fall into patterns which are often of value in mild degrees of malfunctioning in that they indicate special groupings of weaknesses which characterize the early stages of well recognized pathological mental conditions.

The true psychoses, however, do not always have a place in the distribution of efficiency of mental functioning, since responses are not under the control of conscious ideas and are not truly mental in character.

Interdependence of Mental Factors:

Conflicting ideas among different psychologists who make one phase of the mental process the basis of a whole psychological system are readily understood when one considers that none of the different mental factors can be measured without the functioning of the others, and when it is considered that the simplest act of perception involves some memory and some level of reasoning to interpret whatever sensory impression has stimulated the mental process. When one person decides that a study of perception would include all psychology, and another thinks that verbal ability is all-inclusive, while still another leans towards learning or reasoning, or motor response as all-inclusive, their views are seen to differ only in emphasis since none of the capacities can be adequately observed or measured without the functioning of the others.

Interdependence of Thinking, Verbal Ability and Tempo in the Evolution of the Mind:

As has been brought out, while ability to abstract and reason is the distinguishing characteristic of human intelli-

gence, symbolic expression is necessary for its normal development. As ability to abstract and reason in units of greater complexity increases, there is corresponding improvement in the efficiency and degree of awareness with which underlying processes can be performed. Level, efficiency, and increasing subtleties of expression have probably evolved together with increase in delayed reaction time. This has permitted more time for responses to be controlled by the effects of past experiences. As the three phases increase each affords opportunity for the further development of the others.

In the evolution of the mind there is probably a mutual relationship in the development of thinking, of language, and of delayed reaction time. Neither can be thought of as having precedence over the others in its origin. It may have been a purely fortuitous circumstance when a new idea was followed by a symbol and response was delayed long enough for a person to become aware of it and make it available for effective use in some future experience. However it may have happened, the event was undoubtedly a turning-point in the intellectual development of man,

CHAPTER X

PSYCHOLOGICAL ANALYSIS IN THE INTERPRETATION OF PATHOLOGICAL BEHAVIOR

The Level-Efficiency Analysis in Mental Diagnosis:

Different pathological groups whose malfunctioning had previously been attributed by psychiatrists to psychogenic causes and who had had corresponding psychiatric or psychoanalytical treatment, disclosed a pathological degree of malfunctioning, which had evidently been the reason for seeking advice. Interpretations based on a belief that symptoms had originated in bad mental habits or other causes not of a constitutional nature could not be substantiated. It became apparent that the behavior deviations are best understood by considering weaknesses due to inefficiency of mental functioning in relation to level of intelligence before studying the environmental situation or before assuming that there is nothing else to study.

All peculiar behavior which serves the individual to no purpose, such as useless, easily detected lying and stealing, is primarily due to defective functioning of intelligence. Unless there is some fundamental defect in judgment such modes of behavior do not develop into habits in a society or group in which they are not acceptable. They develop when a person lacks capacity to be normally influenced by society, and when he is unable to evaluate the consequences of his actions or to control them. Pathological mental mechanisms result from failure to grasp the meaning of total sit-

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uations within normal time limits which, in turn, is due to inefficiency in control and recall.

The Experimental Neuroses:

Attempts to study neuroticism by teaching sub-human animals opposing habits until they reach a state where — wisely it would seem — they lie down on the job and make no responses, do not help to clarify such problems. Unfortunately, such experiments confuse a constitutional condition, which is an underlying cause of neuroticism, with poor pedagogy. In one case, the subjects cannot do things; in the other, they are confronted by situations in which there is no reason, conscious or unconscious, for effort, since their habits have not been marked by success in any one direction. Such studies throw little light on pathological mental conditions.

Psychological Analysis Applied to Border-Functioning Subjects:

Scientific psychological analysis of border pathological subjects reveals fallacies and lack of understanding inherent in the application of many terms often used as explanations of such conditions. Many theories and classifications emphasize traits which are due to lack of normal development of personality and character, and which are assumed to *cause* the neurotic personality of which they are really the result. The reasons for peculiarities of personality and failure to make normal adjustment become clearer when a person's handicaps and fundamental weaknesses are understood. If, for example, we realize that the characteristics of psychoneurotics are primarily due to measurable mental incapacity and that they are weaker than normally adjusting persons in all phases of mental functioning including the integration of the data that they do receive, there naturally follows a

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different and more appropriate approach to their problems. On the other hand to describe weakness of memory as an incapacity to separate the ego from a given situation furnishes no information of value.

The results obtained from the application of the level-efficiency analysis to psychoneurotics are in accord with pre-Freudian views in attributing their condition primarily to neurological conditions. In the simplest tasks the psychoneurotics are inferior to normal persons of the same age and level of intelligence. This is not because of unwillingness to try but because of inadequacy arising from abnormal timing of their inner associative processes. Other hospital groups usually show a greater degree of malfunctioning.

Though weakness may be more pronounced in some mental factors than in others, the mental functioning of the average paranoid and hebephrenic patient is too poor in all phases to permit of their making independent adjustment; while patients in organic groups, even those who are out in society and hope to fit into the economic system, tend to have efficiency scores below the lowest normal in everything except occasionally in memory span. Since we know from experience with such cases how impossible their adjustment is except in an especially planned optimal environment, the futility of trying to help their adjustment except by medical aid and adjustment which is based on *scientific psychological analysis* is apparent.

Psychogenic Theories and the Normal Population:

The mental weakness found in all these maladjusted groups indicates that whatever is valid in psychogenic theories is more applicable to normally functioning persons who can be helped by studying their environmental problems, than it is to pathological cases for whom the theory of psychogenesis once seemed to offer so much hope. But the

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psychogenic theory is of no help to even maladjusted persons of normal functioning unless we first ascertain, by means of scientific procedures, their capacity for understanding advice and the ability to carry it out. A normal person with sufficient intelligence can be trained to think more carefully. He can be made to realize that his decisions are too emotionally toned. He can be helped to see that his behavior is apt to be influenced by faulty logic. He can learn to consider more carefully before making up his mind.

This is not the case however with the pathological group, even those who suffer from only slight impairment. They need longer time to perceive and learn, and success in helping them depends upon a knowledge of the degree of their underlying weakness as well as of their level of comprehension and their strongest mental capacities.

Misinterpretations Arising from Unscientific Diagnoses:

The lack of appropriate scientific instruments for detecting weakness in the border mental states has been the cause of frequent misinterpretations of mental symptoms. These interpretations take various forms, and conclusions are often drawn from associative reasoning and from the use of analogy, as if the two parts of the comparison were equal throughout.

There are also unsound interpretations in which apparent causes of malfunctioning of extremely deteriorated persons are used to explain peculiarities of the border and normally functioning groups. Behavior of the pathological group is often interpreted as due to causes which would be probable if a normally functioning person were behaving in the same way, but they are entirely improbable when applied to persons of decreased capacity.

As an example, there is a theory that because deteriorated persons show inability to control instinctive responses which

are gratuitously assumed to cause their condition — as if the urge piled up, and a person had to make up for lost time — it follows that normal persons would suffer grave consequences if there were any barrier to the frequent functioning of fundamental instinctive tendencies. Such a view results from incomplete knowledge, lack of controls in research, and ignorance of the fact that normal persons have a large number of instinctive urges and interests, so that choice determined by experience rather than repression is the rule in dealing with them. Another frequent cause of misinterpretation is the bias of examiners toward either environmental or constitutional factors as causes, a situation which is to be expected when there is no checking of conclusions by means of scientific procedures.

Spurious Symptomatology:

Much symptomatology is spurious because the symptoms have been colored by behavior which springs from intelligence rather than from the abnormal mental condition. The idea that there is a particular selection of material which is remembered or recalled by mentally impaired persons, is not valid unless by selection is meant either data due to intelligence or the retention of the oldest and most thoroughly learned data. Certain details surprise examiners because they are products of a higher intelligence than the impaired mental state suggests. The anomaly of a patient who fails easy things but does hard ones is frequently noted. It is not anomalous, however, when we realize that "easy" often refers to the apprehension and integration of new data and so is dependent upon the condition of the inner neurophysiological environment, while "hard" refers to difficulty due to level of intelligence. Of late, more attempts have been made to control this factor, but failure to recognize the need of a test which is little affected by poor mental

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functioning has continued to obscure the importance of such a control.

Much unsound interpretation arises from failure to control level of intelligence. Symptoms are apt to be confused with factors which are not characteristic of the pathological condition. The kind of responses which are solely the result of intellectual level and of corresponding interests, is not differentiated from those due to impaired mental functioning. For example, a patient was described as showing no mental defect because he was courteous, understood long words which the feeble-minded could not comprehend, was proud of his heirlooms and could give their correct history, recalled past events clearly, and did satisfactory work in an institution. Because of all this, his behavior was interpreted as malingering, and this view was adhered to in spite of the fact that it was not considered safe to let the patient out of the institution; that he could not repeat four digits, nor remember recent events, nor even keep in mind what he had started to do. Such an error in diagnosis could not occur if persons working in mental pathology had had adequate scientific training in the psychological field in which they happen to be allowed to specialize.

In this case, ideas of mental impairment were distorted by ignorance of the fact that insanity and deterioration are not primarily intellectual defects, and that old, former habits of behavior, learning, and interests may be retained after there is an extreme degree of mental deterioration and long after it is almost impossible to assimilate and retain new ideas.

Judgment and memory are often considered intact when there is marked incapacity either to learn data which would be needed in judging new situations, or to synchronize what is pertinent and already known so that these data can function effectively in reaching a conclusion. The deteriorated person does not have good judgment. What he may have is

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good memory of previous judgments which work satisfactorily in familiar situations. Unfortunately, persons in pathological mental conditions tend to cling to these "judgments" and to decide in an habitual way even when conditions are altered and another decision would be wiser. This situation is entirely different from conservatism in that there is either a lack of ability to see that there is anything new to consider, or inability to retain the effects of such knowledge long enough to permit its assimilation with other pertinent data so that it will have an effect on the conclusion.

Such recognized abnormal conditions as loss of judgment or loss of ethical feelings come under the heading of pathological mental functioning which keeps a person from adequately using his past experience in new situations. A condition like aphasia is the outward effect of incapacity to use the past effectively. It is a loss in the associative ability which is necessary to effect recall. However, unlike losses in extreme organic and senile deterioration, the normal functioning of the past can sometimes be resumed under improved conditions.

Suggestibility:

The phenomenon of suggestibility is best understood as a result of the failure of pertinent associations to function and offer opposing views which would tend to inhibit the suggested beliefs. It may arise from a certain type of mental deficiency in which there are no opposing habits. It may even among intelligent persons come from ignorance about a particular subject and the consequent ready acceptance of the word of an expert; or it may be due, as is the case with pathological subjects, to inadequate functioning of the past in new situations.

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Logic-Tight Compartments:

Sometimes, of course, habits which are the result of education and early training keep two groups of ideas from influencing one another. When there is no general principle as a guide, dual codes of ethics may exist, as when principles for dealing with individuals are not carried over into business; or when justice is demanded for one group but not for another. In such cases, the two systems have as little chance of becoming integrated as the Lord's Prayer and the multiplication table. This is due to early motivation and choice, however, not to incapacity. In these cases connections have never been made. This is not a case of split personality, since the normal person never made the connections and may never have paid any attention to them. The pathological person has lost the ability to make new connections and cannot make use of associations which have previously been established.

Behavior and Mental Impairment:

External signs of pathological mental conditions are less puzzling when they are considered in relation to the course of mental impairment. If it is recognized that mental impairment begins with slower, fewer, and less adequate associations and slowed learning capacity; that the most recently learned data and the most recently acquired mental capacities are the first to fail, while the earliest learned are retained longest; and if it is recognized that responses to immediate sensory stimulation are among the last capacities to be retained even when the responses may be automatic and meaningless; then, many facts in regard to pathological mental conditions are more readily understood. The fact that in pathological mental conditions perception of ideational stimuli is slower than perception of sensory stimuli is a finding logically to be expected, since in the former, percep-

tion is dependent upon meanings of words which had to be learned and upon a grasp of contexts which has been slowly acquired by experience. Response to the concrete is easier than response to the abstract because attention to the concrete is an earlier developed instinctive tendency which did not depend on learning and may occur when there is a very low degree of mental activity. On the other hand, expression which is essential to the development of abstract verbal ability had to be once learned and is now being forgotten.

That dementia should result in the gradual disappearance of the highest psychic level is also consistent with the fact that the most recently learned is the first to weaken, since the functioning of the highest psychic levels depends upon the co-functioning of the effects of past experience and learning with correlative verbal expression which is used with varying degrees of awareness. The fact that a deteriorated mind may be attracted by anything it sees or hears, and the fact that it may respond instinctively to any detail or object to which it is visually or aurally sensitive are examples of some of the earliest manifestations of mental development. That such impressions are not *intelligently* perceived is due to failure in the functioning of appropriate memories to give them meaning.

For similar reasons, there is difficulty in reasoning and in concept formation, since such mental activities require a normal synchronization of the different phases of the mental process which have to function together before a concept can be developed or before a conclusion can be reached. Also power of voluntary attention is diminished because continuous attention requires a constant succession of new ideas which, in turn, depends upon ability to make use of a normally functioning past. It is easier to react to details than to wholes, because the latter are the result of experience, memory of which is being lost together with the implicit

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verbal expression by which the wholes were known. Memory of two complex figures simultaneously exposed depends as much or more upon seeing relations between the parts and being able to give these relations verbal expression, as it does upon visual imagery. If words cannot be recalled and used to hold the figures in mind, complex patterns can not be remembered.

Defects in time orientation are of importance in psychopathology, because they show weakness in the apprehension and retention of experience which has marked the passage of time rather than because of any *mysterious* connection between time and insanity.

Marked changes in personality are to be explained by basic mental changes caused by illness or some other physical condition which weakens the brain and changes the tempo at which it functions. The mental changes first appear either in slower recognition and apparently decreased interest, or in over-quick responsiveness and little understanding. Only later do the changes assume a qualitative aspect.

Behavior without Mental Correlates:

An apparently contradictory situation is not uncommon in which a patient will carry through an habitual activity once it has been started but will never initiate such activity of his own free will nor indicate any desire to do so. He will eat food that is set before him, or he will carry through the sexual act after having been sufficiently aroused; but if left to himself, he will not become aware of any appetites nor seek to gratify them. In such cases, what we have is response made in an habitual fashion, although mental functioning is so much impaired that there is no clear ideational stimulus to cause voluntary response. The situation is psychologically like that in which mathematical computations are performed by persons accustomed to dealing with num-

bers. They may still be able to perform indicated operations from habit, when they cannot apprehend the conditions of an unfamiliar problem sufficiently to decide on the kind of calculation necessary for its solution.

Much behavior among malfunctioning persons is interpreted as due to purpose when there is really a lack of mental activity. Psychological analyses of much impaired patients, whose responses are interpreted as "seeking" or "fearing" something or as avoiding some calamitous event, show that such alleged mechanisms are the outward effects of inability to comprehend and do things. Under such conditions responses, if any, are the result of chance association. It is not unusual in testing the memory of deteriorated patients to find that they forget part of the directions and, instead of even realizing that there is probably something else to do which they do not recall, either entirely lose awareness of the situation or use the material in some habitual or accidental way.

Since everyone tends to do or say things that are habitual during much of his waking life, the mental conditions of extremely malfunctioning persons cannot be thought of as entirely different from that of normally functioning persons in this respect; neither can it be thought of as a gradual retracing of developmental stages, nor as an unmasking of consciousness. It is rather a restricted and narrowed functioning because of a gradual loss of learning, until finally none of the accustomed connections can function so as to cause the past to be effective in the present. An important distinction, however, between the unconscious activity of normal and of very deteriorated persons must not be lost sight of. The normal person has some degree of awareness of the implications of a situation and of the possible consequences of his habitual acts, while the pathological person may respond without awareness of causes and consequences.

Complexes as Habits:

A complex is too often treated as an entity when it could be better understood in terms of learning as related to intelligence, interests, and failure in the functioning of critical judgment. Parents set up certain standards which exert an unconscious influence on a child's behavior, as is true of all familiar experiences and all old learning unless it is nullified by contradictions and discrepancies subsequently realized. If the parents are particularly fine, children become familiarized with standards which make it difficult for them to be satisfied with lower standards and which make their critical judgment more exacting. Such factors do not produce complexes in the minds of normally functioning persons with good intelligence, who daily make adjustments to changes and continue to see familiar things from new viewpoints. When complexes control people to an unusual degree, the real trouble is in the failure to modify old beliefs in the light of new and varied experience. In a normal environment where varied kinds of persons and beliefs are met, this is attributable to inefficiency in the functioning phase of native intelligence, and to incapacity to evaluate new experiences adequately and to make use of them in new situations.

Whether or not the word complex be used to signify unconscious functioning of which the subject himself is unaware, the only way to control or change its effects is first to determine a person's capacity to change. If, for example, we are dealing with an inferiority complex, which is seldom unconscious even when not openly admitted, the first step is to analyze the person's mental capacity in relation to his environment; to determine how much real inferiority there is, and whether it is genuine, or only apparent because of the relatively better capacity of friends and associates.

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To regard an inferiority complex as an active force is unsound. Under some conditions and among some associates, the ideas and feelings involved may act as a spur to activity. However, it never created ability which did not previously exist, although it might start the use of ability which had remained latent because of lack of incentive. The fact that a feeling of inferiority is often due to a conscious realization of actual weakness places a doctrine, which maintains that the development of personality depends upon compensation for feelings of inferiority, among the cults which make partial truths the basis of new systems of belief.

To learn to recognize one's possibilities and to utilize them; to be aware of possible weak points without uselessly exaggerating them — these are normally intelligent procedures within the scope of persons of average and superior intelligence if their mental functioning is normal. Ideas of the self become exaggerated when an individual is subjected to constant praise with little criticism, or when he meets few people who are superior. A mentally weak person who has lost the ability to evaluate events may become too optimistic about his capacities and charm; his apperceptive background cannot be normally used and he consequently lacks ability to estimate his worth in the light of his knowledge and intelligence. His appraisal of himself will then be exorbitant, depreciatory, or vague, according to his physical condition and his particular mental weakness.

Effects for Causes in Psychological Interpretation:

In interpretations of pathological mental conditions, causes have been too mixed with effects. Mental weakness has been given too positive a role. Being "the maker and the made" is more effective as philosophy than as a basis for scientific method. Such a phenomenon as religious mania,

for example, which shows in overquick associations with incapacity to comprehend new data and with uncontrolled functioning of familiar speech habits, is often interpreted by naïve observers as due to the effects of too much religion. Such inversion runs through much observation of pathological mental conditions and distorts the true significance of the phenomena observed.

Regression and Infantilism:

Such terms as regression and infantilism have misleading implications. It is true that if a normally functioning person curled up and did nothing, we might assume that he had some reason for doing so; but there is no reason to suppose that this is true of persons in an entirely different condition. After having seen our border malfunctioning patients make great efforts to keep in touch with normal life, and having seen that their degree of mental impairment is so great that the task is beyond their capacity, it is impossible to accept the thesis that similar inactivity observed in even worse states is purposeful. Instead, there is mental incapacity which first manifests itself in some degree of inefficient functioning. After a while, instead of merely retarding the functioning of abstract intelligence, it prevents its functioning at all in new situations, although the functioning of old habits often gives the appearance of normal mental activity. Finally a stage is reached in which all the mental factors are affected. But in all this, there is no time when a stage of childhood, or of babyhood, or of prenatal security is reproduced. The reasoning process by which such explanations are reached is of an immature nature and seems to be to the effect that because ability is less than adult ability, it is like that of a child. Therefore, there must have been a regression to a childhood or infantile level so that — reasoning *ad absurdum* and *ad nauseam* — the lowest stage of mental

functioning is like the prenatal condition, such a stage having been reached in the regressive process through an overwhelming desire to escape the problems of real life.

Normal Child versus Deteriorated Adult:

The similarity, however, resides solely in the fact that there is less than adult ability. The likeness is about the same as that between a genius and an idiot, in that both are different from something else. Instead of these two conditions being alike, however, they represent the greatest extremes of difference. The child *in utero* is an active organism, responding to every stimulus provided by its environment. The adult in stupor is an organism whose mechanisms no longer function normally, either because stimuli are not psychologically received, or because there is not enough energy to initiate a response. It is probable that a combination of both causes produces the worst stages of catatonic stupor, while in a slightly improved condition, perception may begin before there is enough stimulus and energy for motor response. A *normal child* is quick of perception. He is making normal progress. He is alert and interested in his surroundings and interprets them according to his limited experience. The psychotic or very deteriorated person is on the contrary slow of perception and is both losing the ability to perceive and interpret the meaning of things he would normally understand and lacks the ability to respond with appropriate behavior.

The Border-Functioning Group and Interpretation of Behavior:

The fallacy in much of this reasoning is due to ignoring facts which would have been apparent had there been sufficient study of the intermediate stages in which measurable mental efficiency is combined with a desire to lead a normal life. To think of the extremely malfunctioning mind as

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primitive or archaic is to distort the truth about it. The evidence indicates that ability to understand the new in terms of the old is lost and that instead of there being thinking which might be described as archaic, there is practically no thinking at all, but merely chance responses to chance stimuli. This point is emphasized because of general acceptance of principles of interpretation which have been erroneously deduced from observations of persons in extreme states of malfunctioning.

It is true that many persons in the border stage of functioning can summon enough energy under great stimulus to make an effort. In the long run, however, they could not maintain the effort as normal people can; and the assumption that they could do things if they only wanted to is without foundation. On the other hand, normally functioning persons could probably not do some of the things that malfunctioning persons do. It is probable that they could not become psychologically unconscious of pain unless there were an equally strong stimulus in some other direction, or unless a severed or nonfunctioning nerve led to physical incapacity to feel pain. There would still be too many sensations that the normal person could not ignore.

Herein probably lies the key to psychological anaesthetics and paralyses. There is not a physical severance of nerves, but the neural mechanism has ceased to function normally so that it either takes more effort to be conscious of sensation or there are no sensations at all. Pathological persons either need more energy or a better machine than they have, or even both, in order to initiate a response to a stimulus.

Pathological Inattention versus Normal Contemplation:

Religious devotees, who fulfil their duties by enduring conditions which would be torture to others, or by just do-

ing nothing at all, might possibly be susceptible to a different kind of religious duty if their mental functioning were of the more alert type. After finding that they can "just sit" without too much misery, and that sitting causes them to be held in veneration, they are naturally ready to serve society in that capacity. Such behavior is psychologically different, however, from the true contemplation of normal persons, who find that meditation or rest gives their ideas a chance to become integrated and helps them to arrive at illuminating truths.

Incapacity to perceive data in the sensory field is often misinterpreted, because similar responses are assumed to be attributable to like causes. Yet the behavior may be due to different mental causes and in some instances, to a lack of mental activity. Dementia praecox patients who bite their fingers until they bleed are, psychologically, behaving no differently from normal persons who bite their nails or cut off dead skin. The difference is that the normal person stops before he is hurt. The praecox patient keeps on because it does not hurt him. His neurological system fails to convey the message. Refusal to eat is similar. It is merely due to not feeling hungry. Unlike the normal, the time orientation of the deteriorated patient is defective as well as his ideal of eating regularly for his health, whether or not he feels an immediate need for food. Such persons are not seeking death. They are merely unable to experience life. They are inclosed within narrow mental confines where it is increasingly difficult to receive impressions from the external world. They may seem self-centered and introverted, but it is from necessity rather than from choice. And as for considering them immersed in their own thoughts, their thoughts are increasingly meager and often when there is apparent thinking, there is actually only blankness.

An example of the erroneous assumption that similar outward conditions spring from the same inner causes is the misinterpretation of the student type of personality, whose mental processes are apt to be confused with those of introverted persons and mild dementia praecox patients. The normally functioning student type differs from the pathological introverted type in that his entire unconscious is functioning under control in a normal framework of time and he is interested in new events and normally able to interpret them.

The Very Deteriorated and Insane Incapable of Purpose:

Such a term as fabrication is misleading when applied to deteriorated persons in that it ascribes purpose to persons no longer capable of comprehending situations or the implications of their responses. Instead of saying things to cover up a memory defect, they are answering with whatever words or ideas the situation may stimulate. These are usually familiar habits of speech, or if the condition is even worse there may be merely syllables and sounds which are not even connected with old habits. In memory of drawings, we often see something that was frequently done in childhood. Pencil and paper are usually stimuli to write, but often the patient may not write the thing he is asked to write because he has not grasped the meaning of the words said. Purpose implies the functioning of past experience under a controlling idea. Very deteriorated and psychotic persons are incapable of purpose. They merely have habits which function at low perceptual levels. Characteristics often noted in deteriorates, such as gross errors in spelling, changes in penmanship, slips and inversions, are to be classed as examples of loss in the memory phase of mental efficiency at a stage when the functioning of some of the best learned habits is beginning to weaken.

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Because a normal person may choose to refrain from an act, pathological lack of action is often interpreted as inhibition, when actually the functioning is so slow and so out of time that there is genuine lack of capacity to do the things which are supposed to be inhibited. If a normal person pays little attention to outside things or if he fails to respond as soon as expected, we are justified in assuming that for the moment he is truly self-centered. But the same conclusion does not necessarily follow when a senile or dementia praecox patient acts in a similar fashion.

Concentration and Dementia Praecox:

Contrary to ideas based on observations of very deteriorated persons, ability to concentrate is a characteristic of the dementia praecox patient as long as his brain functions even approximately normally. It is his greatest asset. His weakness is in slow apprehension of new data on which to concentrate. He is relatively impervious to diverting stimuli, and shows a lack of distractibility which makes it possible for him to retain an idea through circumstances which would immediately drive it from a normal person's mind. Such patients may even be fundamentally social, but like "The Hairy Ape," they find it impossible to make contacts with people and exercise their native social interests.

Since character is a quality which depends upon consistency of conduct relative to some belief or principle, and since the effects of such acts weaken and fail to function in extreme deterioration and in insanity, and since such weaknesses begin to show in border-functioning groups we have to agree not only that there is no character to the insane but also add to this that weakness of character is usually a mark of the neurotic personality.

The border-functioning person probably uses all cere-

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bral pathways as does the normal person, but he uses them less effectively because of incapacity to cause the past to function normally in the present. Either because of weakness in the structure of the mental machinery, or because of a lack of fuel with which to work, mental impairment shows in a decreasing capacity to perceive and organize data. The final deteriorated state is not the result of a regression, nor a "falling apart," but is an inability to organize appropriate components in optimum time.

CHAPTER XI

PSYCHOLOGICAL ANALYSIS AND INTELLIGENCE TESTS

Abstract Intelligence an Innate Capacity:

All our observations have tended to show that mental abilities such as abstracting, reasoning, and generalizing cannot be taught. Neither slum clearance nor changes in diet can give abilities of this sort to persons who lack them. However, the efficiency with which an individual's natural ability can function may sometimes be increased by improving the physiological and environmental conditions and this tends to increase the breadth if not the level of intelligence. Such changes as these show in the scatter on intelligence tests. Scatter differs, however, according to type of functioning.

Intelligence Manifested in Different Fields of Expression:

There is little justification for classifying intelligence into different kinds such as social, mechanical, numerical, and verbal. Studies in which level is controlled show that when capacity expressed in these media is superior, intelligence is also above average. Each classification is an aspect of general intelligence representing a kind of data which may be particularly well handled because of special sensitivity to stimuli and facility of response. But with low general intelligence, it is impossible to be very high in any of these four aspects, since these special abilities cannot function in a superior way unless there is correlative ability

to abstract and reason. This is clearly brought out in clinics where results of tests of mechanical ability show distinctive differences between persons of superior and persons of inferior intelligence. The responses of the one would not be taken for those of the other.

Mechanical Intelligence:

It has already been pointed out that verbal and numerical intelligence are merely different modes of expression of intelligence in general, and that the terms are meaningless unless the level of intelligence at which words and numbers can be used is known. The concept of mechanical intelligence is in a state of confusion because levels of mechanical ability are not sufficiently considered in relation to verbal level and in their relation to difficulty of the tests used. Also speed and psychomotor control in simple tests the factors of which are present to the senses are not differentiated from mechanical intelligence which, at its highest levels, would require ability to work with three-dimensional material all of which can not be immediately seen or felt. The ability to understand mechanical ideas is impossible without abstracting and reasoning and the ability to hold ideas in mind by means of symbols to be used in future problems. A relation between intelligence in general, and mechanical intelligence can not be determined by using subjects of only one level of intelligence whether it be inferior or superior; nor by using tests which require only low-level or high-level ability for their success. When a test is not grasped by persons of low intelligence and is understood by superior persons, there is certainly a relation to intelligence whether a correlation shows it or not. There is much confusion resulting from failure to differentiate between psychomotor skill and mechanical understanding.

Social Intelligence:

Social intelligence, which is primarily based upon a native tendency to like and to respond to people, remains no more than a social tendency if it stays at a level at which a person is content to be noticed by others and where he merely hates to be shunned. Social intelligence in its highest form is based on a social consciousness made possible by ability to reason about the feelings of other persons and to use one's imagination in a fashion completely beyond the capacity of inferior persons. Mental efficiency comes in as an added factor which makes an individual either more alert to others or slower to recognize and take in new situations. However, both of these traits are subject to modification in the light of other factors which unite in producing the enigma of personality.

Level-Efficiency Concept and Intelligence Tests:

The level-efficiency view helps to clarify problems of intelligence in the normal as well as the pathological population. It can be applied to all valid measures of intelligence and even to some measures of special abilities, the results of which can usually be interpreted to indicate the probability of good, normal, or poor mental functioning.

Otis Group Test:

For example, the Otis Group Intelligence examination, which is of great value in clinical work, may be misleading if the effect of different types of functioning is not appreciated. Impulsive subjects quickly pick out and answer all the questions they can readily understand without much consideration of others, with the result that they make higher scores in a limited time than does the normally functioning person. The slow type makes a lower score within the short time limit. When the time limit is lengthened but still limited

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the quick subjects may score lower compared to normal subjects since they do not correct their first mistakes, while the slow persons score as high or higher than before. In fact, scoring for different time limits on the same test becomes a valuable clinical device when norms are available. If the scores are used with a test of Level it permits a more illuminating interpretation.

Limited Value of Group Tests in Research:

From this, it can be seen that in clinical work equal scores on group tests do not necessarily denote equal capacity. This fact disqualifies most time-limited group tests of general intelligence as a means of equating individual intelligence for purposes of comparison in research. It is necessary to use other tests to determine the level, and the efficiency of mental functioning, of the individuals who compose the group.

Basis for Estimating Mental Impairment:

Normal persons deviate in efficiency of functioning from their abstract level and patients in mental hospitals — unless they have been mistakenly diagnosed — always show much malfunctioning by the time commitment is advised. Consequently, scores made on tests of general intelligence after commitment to a mental hospital cannot be taken as a basis from which to measure mental impairment. In a preliminary study of this problem groups of hospital patients who were coöperative and even possibly paroleable, averaged about four years below their vocabulary level on both the Otis Group test and in Total Efficiency as measured by the efficiency battery.

Porteus Maze Test:

The Porteus Maze Test begins to have value as a meas-

ure of efficiency of functioning at the level at which the entire maze is no longer within a subject's range of visual perception, and when the correct path cannot be immediately seen. It is at this point that the overquick type dashes ahead and makes mistakes, while the too-slow type is too long in grasping the situation and deciding what to do. In order to get the full value of this test as a diagnostic tool, it is necessary to relate it to some measure of level. Porteus emphasized the diagnostic importance of the relation of scores to mental age. However, he considered only a part of the distribution curve of mental efficiency — the overquick part — and his point of reference was mental age or intelligence in general, which is saturated with the effects he wished to isolate. Consequently, the value is more limited than it might have been if a measure of Level alone had been taken as the point of reference and the responses timed so as to detect the two functioning types. Researches to prove the value of the Porteus test in problem cases have sometimes failed to show significant differences from normal because of failure to measure both the slow and the quick types in connection with a relatively stable point of reference and because the two extremes were lost sight of in a general average.

In studies of types of persons there is corresponding failure to analyze performances of individuals and to distinguish between the two different kinds of scatter. The mean scores on tests which have been given to two contrasting groups often show no reliable difference when Level is not controlled, even though the individuals may show significant deviations from each other.

Revised Stanford Binet Examination:

The Revised Stanford examination can be analyzed so that comparisons can be made between tests which depend

more upon the integration of new data and are consequently more easily affected by the efficiency phase of intelligence, and the tests which are heavily weighted in the abstract-verbal phase. Such an analysis would be useless in cases of extreme deterioration when there is also a lowering of abstract ability as a result of defect in the more fundamental factors.

Thurstone Clerical Examination:

A similar analysis can be made of the Thurstone Clerical examination. It contains three tests which can be performed by persons of second — or third — grade levels. Success for persons of higher intelligence depends mostly upon attention and carefulness and speed. Two other tests require special kinds of clerical operations which are easily understood at average levels but which should be evaluated in the light of the subject's experience. Three other tests, Arithmetic, Spelling, and Proverbs, have substantial correlations with level of intelligence. If the separate parts were scored and weighted in psychological units so that they would be immediately comparable and more easily interpretable as to probable level of intelligence and functioning, it would be a very valuable and time-saving instrument, since in many cases, when no problem is involved, other tests of intelligence would not be necessary.

Stanford Achievement Examination:

The Stanford Achievement examination may also throw light on the efficiency factor, and in the hands of skilled examiners it measures much more than school achievement. In addition to the fact that the first two tests and the last two considered together are excellent measures of general intelligence, the discrepancy between paragraph and word meaning is often the first indication of weak mental tension.

This is because paragraph meaning requires the grasp of a wider range of ideas which must be promptly apprehended or else time will be lost in rereading the paragraph, while the word meaning test is much more readily apprehended and may be carried through within normal time limits even after there is a measurable degree of malfunctioning.

Non-Verbal Tests: The Army Performance Scale:

We are prone to regard non-verbal tests as making use only of data present to the senses and consequently as not requiring the functioning of abstract verbal ability. However, although they are more limited than verbal tests in their capacity to discriminate between degrees of intelligence at superior levels, many of the sub-tests often require more abstraction and reasoning than is realized. If we take the short Army Performance Scale as an example, and interpret it in accordance with the Level-Efficiency Theory, we find that two of the tests, the Manikin and Digit-Symbol-Substitution, are easily grasped at very low levels of intelligence, so that for subjects of higher levels they serve as measures of efficiency of response to simple data. The Ship and the Profile tests are somewhat higher in their demands but persons of nine- and ten-year levels can easily succeed in doing them, so that at higher levels they too measure efficiency of functioning rather than intelligence. Memory Span, which is a fundamental of any mental performance, is measured by the Knox Cube test, but this test measures something in addition, since marked success often depends upon the adoption of a consciously determined method.

The other three tests of the Army Performance Scale are different. Cube Construction unites reasoning with other basic mental factors. Drawing Designs from Memory depends upon much more than memory, for if one cannot generalize and give his generalizations verbal expression, he

fails the more difficult designs which are presented in pairs, since he cannot retain pure visual images of the second design while reproducing the first. The other sub-test, the Mazes, of which we have spoken before, is more dependent upon reasoning than is immediately apparent. It is a form of reasoning that the average person accomplishes almost unconsciously. (1) The premise "there is a way out without crossing any lines" is accepted. (2) The next step is "I can't go this way." (3) Then "therefore, I must get out by going this way." When feeble-minded persons of narrow visual range do not see the way out, they just refuse to believe that it can be done. To them it represents an impossible task. Other failures and low scores are due to the types of malfunctioning previously explained — over-quickness with lack of caution, or too slow functioning.

When time of perception and response to easy questions, reasoning, span, and memory which demands generalization and implicit verbalization, are combined in a group of tests, we get high correlations with intelligence because elements essential to the functioning of general intelligence are present. The advantage that a performance test has over a verbal test for the foreigner is that he can use his reasoning and generalizing ability and the corresponding implicit verbalization no matter what language he speaks. All performance tests are not psychologically alike and those that can be done by persons of low level of intelligence bring out few factors among persons of higher levels except the efficiency with which they can function in doing the particular tests.

The MacQuarrie Test of Mechanical Ability:

The MacQuarrie Test of Mechanical Ability is of more clinical value when subjected to analysis than when only a gross score is used. Four of the sub-tests depend essentially on psychomotor control, vision, and speed. These particular

sub-tests can be understood by very young children and by adults of inferior intelligence. Consequently, in any group at or above the moron level, they mostly indicate efficiency of mental functioning in addition to measuring the motor facility for which the tests were planned. The other three sub-tests are rather measures of the intellectual aspect of mechanical ability — the kind of intelligence which the mechanical engineer must have. They require estimating, reasoning, and judging. The Block-counting test in particular requires reasoning, since all the blocks are not present to the senses; and it is necessary to reason in order to determine how many each pile contains. As a result, most persons of inferior intelligence cannot comprehend the test. However, while success is positive, failure is not definite since it might be due to poor mental functioning as well as to an inferior level of mechanical intelligence.

The Girls' Mechanical Assembly Test:

Even the Girls' Mechanical Assembly test, which was never intended to correlate with intelligence, had to have two tests which were more difficult and which offered something of a problem, in order to invest the examination as a whole with predictive value beyond skill and speed in special but easily understood tasks. Median scores increase with levels of intelligence while time decreases.

Special Tests:

What is true of examinations which purport to measure general mental abilities is also true of tests devised to measure special mental factors. No matter what kind of data is used, whether words, numbers, pictures, or data of a more concrete nature, they do not measure the essentials of intelligence unless they make demands in increasing degree upon generalizing and verbal ability.

Opposites:

To take the Opposites test as an example: if all the words are such that they can be easily answered by persons of low levels of intelligence, it can measure only efficiency of the functioning of intelligence for persons of higher levels; and it can do this only if the responses are timed. If, however, the words of such a test are selected so as to be increasingly difficult, they are indicative of a person's intelligence level. The term "greater difficulty" does not apply to words which are missed because of lack of opportunity to become familiar with them, but to such as require increasingly greater discriminative and reasoning capacity.

Spatial Relations:

Tests purporting to measure ability to see spatial relations may measure perception of spatial relations at low levels. However, when such tests become increasingly complex in design, and when the correct response can no longer be immediately perceived, they require reasoning and estimating; and so measure much more than the name implies.

Memory:

Memory is a factor which hardly needs statistical abracadabra for its disclosure, since it is a name for a phenomenon which everyone can observe and agree upon, and is possessed by almost the lowest grade of idiot to some slight extent. The important consideration about memory is the level at which it can function; the kind of data one can remember; and the relative efficiency of the functioning of its different phases.

Imagination:

Similarly, the word imagination is practically meaningless unless one knows something of the speed of the associative

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processes, how well they are controlled, and the level at which imagination functions. An imagination cannot be great irrespective of level of comprehension. It cannot be rich irrespective of the learning phase of intelligence. And, if the numerous associated processes do not function under the control of an idea in a normal framework of time, the results will neither be sound nor of any social value.

Synonyms, Analogies, and Number Completion:

Tests inviting the use of synonyms, analogies and number completion have little significance as to intelligence unless the lowest and highest levels at which they can be understood are known. They must also be free from practice effects and they should make increasing demands upon discriminative and reasoning capacity. Anagrams and homographs, and many other tests classified as verbal, require thinking in new situations and are dependable as measures of level only if they have been standardized at different levels of developing intelligence and if they allow unlimited time for recall of data. To include all of them under the general name of verbal ability, to treat them as if they were psychologically the same, and to regard them as equal to a well-standardized test which contains words familiar from childhood and which is not sensitive to differences in mental functioning, is to make a logical error and to cause psychological confusion.

Level, Efficiency, and Special Skills:

These considerations demonstrate the necessity of differentiating mental level from mental efficiency and differentiating both from success due to special sensitivities and skills. They also emphasize the need of a constant in psychology, of some measure of mental capacity which retains the same value in spite of fluctuations of other measures.

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The best which has so far been discovered in the present researches and which is valid with the widest variety of subjects, is the Terman-Merrill Vocabulary Test. This test when used in conjunction with the Efficiency Battery provides a kind of psychological analysis which is essential to understanding problems of behavior and to the determination of methods by which readjustment can best be accomplished.

CHAPTER XII

GENERAL APPLICATIONS OF THE LEVEL-EFFICIENCY THEORY

Level-Efficiency Concept in Diagnosis:

Changed conceptions of the fundamental cause of the neuroses and other psychopathic conditions, and the resulting clarification of cause and effect in behavior, illustrate the advantage of a scientific approach over gratuitous interpretations.

Earlier Diagnostic Possibilities:

The Level-Efficiency method of analysis makes the application of quantitative measures possible for the group whose mental functioning is poorer than normal but not poor enough to be readily recognized as a cause of abnormal behavior. Knowledge of the place of this group on the curve of distribution between the normal and the markedly impaired and analysis into different phases of mental functioning furnishes a sound basis for understanding them. It makes earlier recognition of mental disorders possible and increases the chances of success of medical treatment and of preventive or alleviative measures at a time when a generally weak physiological or neurological condition might still be remedied. It also helps to prevent maladjustment by making it possible to plan education with consideration of mental weakness in relation to environmental conditions.

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It helps to bring out the changes which take place under medical treatment and to reduce the number of cases for whom diagnosis and paroleability from a mental hospital are uncertain, by affording a clearer understanding of their mental status.

Constitutional versus Environmental Factors:

In all psychological problems there are two aspects which tend to confuse the issue. These are constitutional capacity or the mind's inner environment and the *outer environmental* situation. Some tests measure one, some measure the other, and some depend on both in unknown proportions. The questionnaire type of personality inventory is probably much influenced by the effects of environment upon an individual's constitutional capacity, his special abilities, and his feelings about his ability relative to that of members of his family and friends. Because of this, extreme positive or negative scores on such an examination are apt to be made only when mental functioning is so good that the person can dominate his environment, or when functioning is so weak that the environment almost completely dominates the person. Such a relationship exists between the Mental Efficiency Battery and the Bernreuter scores of very neurotic persons and those markedly lacking in self-confidence. A psychological analysis is needed to help ascertain the causes of adverse personality ratings and the extent to which they may be due to constitutional weakness.

Deteriorated Intelligence versus Inferior Intelligence:

Besides clearing much of the confusion in the interpretation of pathological mental conditions, the Level-Efficiency analysis makes possible the separation of essential symptomatology from many of the secondary signs which are essentially due to low intelligence or to extreme degrees of de-

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terioration. This is readily apparent, except at extremely low levels and in extreme deterioration, by the type of tests which are most poorly performed, and by the relationship between abstract-verbal tests and the timing of easy tests which are readily understood at all levels.

Learning Defect in Age Distinguished from Learning Defect in Youth:

It likewise helps in differentiating between the kinds of learning defect found in young mildly impaired persons and that more often met with in age or in states of known organic impairment. In the former the learning process is retarded but fixation of the amount learned may be normal. Among aged people both defects are prominent — retardation of learning and abnormally poor fixation and recall.

Mental Profiles in Mild Malfunctioning:

Besides determining the strength of different mental factors and their relation to ability to make independent adjustment, there are indications that the patterns of mental profiles can be used to discriminate early stages of conditions which later take definite clinical form. In cases in which neurological correlates cannot be determined, or where they are at best vague and general, measurement of the different phases of mental functioning gives the only clues to the neurological condition. When level and degree of malfunctioning are practically equated, characteristic differences are noted between different clinical types. A manic-depressive group for example is slower than a dementia praecox group in answering simple personal questions, in Warming Up and in Initial Learning. That this is due more to speed of apprehension than to pure learning ability is shown by the superiority of the score for learning with recall over that of the dementia praecox group. Scores on Motor tests are

relatively slower than scores of the dementia praecox group except those of the catatonic type from which they are differentiated by better learning ability.

Psychological Analysis and Normal Mental Functioning:

The present technique of Psychological Analysis has also proved its value with normal persons whose mental functioning may deviate so greatly in different phases that they are handicapped even though their functioning as a whole is not pathological. There are wide differences, for example, between persons who measure within the normal interquartile range of mental efficiency, which a clinician cannot ignore. These deviations show in type of personality as well as in mental efficiency. Much unfortunate advice results from the acceptance of such words as "average" and "normal" as if they had a definite meaning instead of indicating wide ranges of abilities that must be more precisely defined to be scientifically useful. More exact measurement helps to clarify school problems of pupils whose capacity is not understood because they are considered "normal average" and their abstract level had not been determined separately from their mental efficiency. This has resulted in sending them to unsuitable high schools or colleges. Many "average" children prove to be scholastically borderline with quick alert functioning. When an adequate analysis is made of their capacity they are seen to be the victims of one of our greatest educational errors. Alert persons must be doing something; and if society does not furnish stimuli to which they can respond understandingly, they find other stimuli themselves, whether within the law or not. While students of this class are not as capable of high school or college work as they seem to be, pupils of slow functioning may have more scholastic aptitude than their lack of alertness and certain phases of their achievement would indicate.

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They may even have capacity for the highest type of intellectual work provided they do not try to absorb the content at too rapid a pace.

Psychological Analysis and Superior Functioning:

In addition, there is the very brilliantly quick type who has superior intelligence in all mental phases. Such persons tend to be at the head of the class, and usually succeed too easily for the development of good mental habits and character. They need to exert little effort for success. They meet with little contradiction and thus lack the stimulus to self-criticism which might induce them to check their judgments and opinions. As a result, they fail to form habits of effort and concentration on new problems. In their early days they may be classified as geniuses; later they may emerge from school with little to show for their years of education except cocksureness, bad habits of overquickness, and poorly controlled thinking. The mis-education of this group is a great weakness in our society. Self-assurance, aggressiveness, confidence, and dominating tendencies are assets only if checked by habits of consideration of the validity of conclusions and by taking care to learn all data pertinent to opinions and judgment.

Psychological Analysis at Inferior Levels:

At inferior levels of intelligence the method of psychological analysis helps to discriminate between feeble-minded pupils and persons of low abstract ability who are not feeble-minded. For such persons an analysis is useful in indicating possibilities for education. It shows whether span, learning capacity, memory and other abilities are poor, normal or exceptionally good. It brings out fundamental incapacities which would render training useless and would warrant a diagnosis of feeble-minded. It also indicates whether very

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simple handwork or any kind of work within the level of comprehension is possible and whether there is capacity for speed after training in spite of slowness in learning.

Psychological Analysis in the Schools:

The method involves the kind of analysis that should be made of all doubtful school cases especially at about the fifth grade, when real capacity is no longer offset by early lack of experience and lack of opportunity to learn to use the tools of thought. A large part of the constitutionally malfunctioning group could be detected with certainty in the fifth and sixth grades of school. The histories of many of them, particularly in the hebephrenic praecox group, show that they are apt to be graded below their verbal level ratings and there is evidence that even these ratings are lower than they would be if they had not been handicapped from birth.

Without such analysis, the results of intelligence tests are misleading. A person of low average intelligence who is not alert in functioning, is more likely to be called a case of deteriorated dementia praecox than is a person of superior level who is really more mentally impaired.

Level-Efficiency Interpretation of Scatter:

Failure to consider the two types of functioning in the normal population — the over-quick and the too-slow — has kept changes in IQ and the problem of scatter from being understood. Changes in IQ result from changes in tests which require the apprehension and integration of new data because such tests are largely subject to practice effect. In cases of slight malfunctioning, a well-standardized vocabulary test tends to score at a subject's normal level, while tests which require the perception and integration of new data score higher or lower according to the type of men-

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tal efficiency of the subject. A benign scatter is shown when such tests score above the individual's verbal level. Mental malfunctioning is shown when certain kinds of tests are failed in below that verbal level. Persons of low level who can adjust usually make relatively good scores in tests which require attention to new data and thus show a favorable unevenness of scores.

Obviously such interpretations are not valid in extreme malfunctioning, when a normal verbal level cannot be determined.

Since different intelligence tests emphasize different phases of the mental process — some being strong in the time aspect and weak in indications of higher verbal level, and others being strong in the abstract-verbal aspect and little affected by time except in a few learning tests — scatter has different meaning according to the intelligence examination used. It also has different meaning at different levels of intelligence, since at some levels tests are more heavily weighted on the efficiency side and at other levels abstract-verbal tests predominate. For these reasons, although intelligence tests may be used to indicate good or poor mental functioning when all factors are not too greatly impaired, the interpretation in many cases will require additional evidence. This necessitates the use of tests especially planned to measure efficiency of mental functioning.

Test-Retest Gains:

No one reason is sufficient to explain gains in efficiency scores on retests. Increase in score is sometimes due to practice effect. However, in a normal population, persons of one type of functioning — those who are somewhat slow in perception on the first examination — tend to make large gains, while those of quick alert functioning may not make gains the second time. Furthermore, gains may be due to

general improvement from a condition of extreme mental impairment. Studies have shown that very deteriorated patients, who later improved, made greater gains in efficiency scores than normal persons could make, since the normally functioning person scores about as high as he can on his first examination.

These considerations make it clear that there is no valid reason for subtracting an "average normal gain" from a gain made on a second examination, and for considering the residual difference between the two scores the true gain in mental efficiency. Nor is there any basis for interpreting a larger score on a second examination as a "lack of coöperation" at the time of the first. To name the Substitution test for example a test of coöperation has no justification. When a patient is doing the best he can, he is coöperating. When he does better the second time, he is either more familiar with what he has to do, or he is mentally more alert and functioning better, or there may be a combined effect of both reasons. Another weak point in considering "average gain" as something constant is that it does not apply to the two types of functioning in the normal population — the one that gains a great deal and the other that gains scarcely at all. The average gain would also be different for each mental level, due to the fact that at some levels more tests are subject to practice effects than at others.

The only way that gain on retests can be treated is to be sure not to give examinations at too close time intervals, and to interpret the results in relation to all the pertinent facts with special consideration to the phases of mental functioning which gain and the phases which show loss, in addition to the degree of loss or gain in general.

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A Case of Surgical Recovery from Brain Tumor:

Graph IV¹ shows the mental profile of a patient who had made good surgical recovery after an operation for brain tumor and who was seeking advice in regard to vocational adjustment. He was examined twice. The examinations were given four months apart. The loss in capacity within the period of time between the two examinations is probably greater than the difference of 1.0 year which the difference between the two efficiency scores implies, since there was familiarity with the procedures at the time of the second examination and the same learning tests were given instead of alternates. Comparison of the two examinations administered shows a definite loss in the learning tests, loss in response to some of the easy tests, and greater retardation in free association. There is loss rather than gain in motor tests and in the easy group of tests which requires naming the days and the months backwards, as well as in the Reversed Digits and the Knox Cube tests. In verbal tests, fewer opposites were given but they were given more quickly, there being an increased speed of automatic response with some loss in control. The patient was quicker in getting started, but he was still pathologically slow and had lost rather than gained in general mental efficiency. Care, hopefulness, and a desire to work did not serve to improve the true condition of a patient who was growing appreciably worse.

Practice Effect in Retesting:

Work with the border group brings out what has been known but generally tacitly ignored in practice, namely, that true mental ages can be determined only on first trials of individual intelligence tests, since the subject should have had no previous practice in the memory tests and most timed tests, as well as those which require the assimilation of new data. When we are measuring intelligence in general, slow

1) See Appendix.

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perception should affect the score, for it decreases the apprehensive background and lessens the bases for judgment. The possibility of gain with practice is important and if scores are to be understood, they should be interpreted as such rather than as indicating a greater amount of intelligence.

In a normal population which includes school children, tests should be repeated only after long intervals, when growth will be further advanced and details will have been forgotten. This is not as essential in conditions of great mental impairment. In these cases it is valuable to find out whether practice effect is possible, since among greatly deteriorated subjects a first examination is often recalled in only a vague, confused way.

Factors Affecting Test Scores:

Intelligence test scores really change astonishingly little on retests, showing the consistency with which they measure the factors they are designed to measure. If as much time had been devoted to studying the reasons for variations in test scores as has been used in attempts to demonstrate the supposed inadequacy of well-standardized tests, the science and art of psychology would have made more progress. It would have been realized that increases in the IQ's and mental ages of normal adults, with the possible exception of those following some definite disease which affects the brain, do not show differences in changes of ability to abstract and reason, but indicate changes in the efficiency with which reasoning and abstracting can be performed.

Neither higher vitamin content in diet, slum clearance, nor progressive education can create ability to think and reason. However, many causes including disease, deprivation, or alcohol, can prevent a brain with high potentialities for reasoning from effectively showing its capacity. Fre-

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quent examples of good capacity for reasoning and discriminating with little education or cultural background, and *per contra* of inability to reason normally in spite of ample education, strengthen the thesis that the brain reasons naturally just as the eye sees without training, and that improved physical conditions merely increase the efficiency with which these functions can be performed. If the opposite were true, the proportion of feeble-minded would be greatly reduced in our cities where educational opportunities have so often exceeded ability to profit from them.

The Marginally-Slow Tempo Case:

Aside from contrasting types of functioning found in the normal population, there are many persons who seem normal but are not, and whose abnormality is discovered only by chance. The apparent thoughtfulness of some of these is found to amount almost to a cessation of thinking because of mental slowness, while the quickness of others is only apparent for they are either slow or wrong in response to questions which require concentration. The concentration of the former is more apparent than real; the quickness of the latter is superficial. Only by psychological analysis can these weaknesses be brought out. The former group become problems because of their failure to keep up with others in regular routine performances, although they may show immediate comprehension of things too difficult for others to grasp. The clue to their problem lies in the discrepancy between innately high abstract intelligence and slow perception of new data. The malfunctioning of the second pathological type is not suspected because of an apparent alertness which is deceptive and which gives promise of a capacity which does not exist.

The Third Type of Mental Functioning:

The third type of pathological functioning includes persons who do nothing obviously peculiar, who seem normal in conversation, and who definitely display good intelligence. When they are not of average abstract level or higher, their peculiarities result in a definite classification of feeble-mindedness. Children of this type irritate their parents in countless minor ways, such as being difficult to train in routine household tasks, sleeping late, and not being amenable to the formation of regular habits. Yet if sufficiently motivated, they manage to arrive at places under their own impetus and keep in mind what they want to do. The fact that they often lose their way and take wrong trains is not given sufficient weight.

Psychological analysis of such persons brings out incapacity in the functioning of their apperceptive backgrounds, confusion in the simultaneous consideration of alternatives, and *special weakness in motor tests*. This is not in psycho-motor control, but rather in slowness in carrying an idea over into action and in inability to perform simple repetitive acts with normal speed. When working alone these individuals may have apparent lapses of consciousness during which they do other things in an apparently automatic manner and then, just as automatically, return to the work in hand.

This third mental syndrome which has emerged from the quantitative measures can be thought of as a mild catatonic type of functioning since it is characterized by special difficulty in speed of discrete motor responses with relatively good learning ability and mental clarity.

There is a discrepancy between span and learning which is usual in mild dementia praecox conditions. But though initial learning is slow the fixation phase of learning is practically normal. Mental clearness also shows in

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the Reversed Digits-Knox Cube group of tests which in the majority of cases of mental impairment is among the first of the test groups to be poorly done.

Graph III² shows the mental profile of a subject of this type in contrast with over-quick and too-slow functioning types. In this particular case the contrast between learning ability and motor responses is extremely marked. Except for the lack of feeling tone the catatonic type of person might be thought of as a manic-depressive — unless one would choose to think of it the opposite way and say that the manic-depressive is a catatonic who has strong feeling.

Psychological Analysis versus Psychoanalytic Method:

Certain individual patients, who had been treated by psychoanalytic methods on the assumption that there was nothing fundamentally wrong, and who had failed to derive benefit from the questions and suggestions involved in the techniques applied, revealed pathological deviations in different mental phases which could readily account for their peculiarities and for their desire for advice and assistance. Some of them, who were least suspected of any mental weakness, when measured by the Efficiency Battery showed a pathological degree of defect in motor phases of response as well as indications of catatonic condition much greater than that encountered in a possibly paroleable group in a mental institution. In such cases the most deceptive factor was the relatively good learning ability and mental clearness in connection with retardation in motor response.

Psychological Analysis and Vocational Adjustment:

In vocational adjustment the first and most important step, after the exclusion of gross sensory defect such as blindness or deafness, is to determine general intelligence, since no special abilities can develop to high levels without it. If intel-

2) See Appendix.

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ligence level is poor, it means that a person is debarred from using special abilities in such a way as to accomplish the highest type of work in any field in which he may be interested. If persons of inferior abstract level have great facility together with unusually good sensory perception and discrimination, they may belong to the group of highly skilled craftsmen who are unable to do the creative work of the engineer or the composer. A person of superior intelligence, on the other hand, has, barring special sensory or motor defects, potential capacity for some degree of success in almost any profession he may choose to take up. If intelligence is high, he can compensate for lack of skills and speed, and succeed in superior positions, especially in the phases of work which depend as much or more upon intelligence as upon speed and motor control.

On the other hand, neither intelligence nor special skills can assure vocational success unless these capacities can be mentally controlled and efficiently used. Consequently, it is essential to have some measure of efficiency of mental functioning; for without normal speed and control other abilities are of little profit. Failure to recognize mental handicaps that are not obvious means failure to take the first step in the adjustment of persons who have had difficulty and who seek or need advice.

A difference in emphasis is required in considering the capacities of persons of superior and of inferior intelligence. In the superior group it is essential that weak points, which might interfere with phenomenal success, are not overlooked. This is as important as looking for special combinations of abilities. In the inferior group, on the other hand, a diligent search must be made for any redeeming feature that can be utilized. Psychological analysis proves particularly helpful here because it shows whether there is learning capacity even though it be slow; whether there is normal quickness in fa-

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miliar work; whether only initial perceptions are retarded; and whether practice and familiarity can partially compensate for poor efficiency. It also serves to indicate whether malfunctioning is so general that all phases, even those involving familiar data, are too poor to permit of normal adjustment.

Diagnosis and Time-Limited Scores:

Table XLIV illustrates the way in which scores for different time limits might be used for diagnostic purposes. It gives scores on three tests made by the two contrasting functioning types. Both are of high average intelligence, at the eighteen-year level.

TABLE XLIV
Scores of Three Tests for Different Time Limits
of Two Functioning Types of Persons

| | A. Slow Type | | | B. Quick Type | | |
|---------------------|--------------|----|-----|---------------|----|-----|
| Time in Seconds | 60 | 90 | 120 | 60 | 90 | 120 |
| Analogies | 13 | 12 | 18 | 18 | 16 | 15 |
| Number Completion | 16 | 18 | 19 | 19 | 18 | 18 |
| Sentence Completion | 15 | 16 | 18 | 17 | 16 | 15 |

A is the slow type and accomplishes an average amount or less in the first 60 seconds, but he continues to work carefully, though slowly, and comes up to expectations for his level when given plenty of time. B starts quickly and accomplishes more than an average amount in the first 60 seconds, but in the end he does not score up to expectations for his level, because in the beginning he was overquick and insufficiently critical, and made errors which were not corrected, so that when he finished he had fewer correct answers than A. It is to be noted that the weighted scores made by the slow type gradually increase at the three differ-

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ent time limits, while those of the over-quick type tend to decrease as time is added. These comparisons might not be the same if the number of questions was not limited, however.

Psychological analysis is a method of determining the condition of general mental functioning together with any particular defects which might make adjustment impossible, and any particularly good basic phase which might indicate possibilities for training. It is not intended for purposes of classification but it provides a measure of the capacity of an individual to deal effectively with future problems.

A Minimum Psychological Analysis:

A good psychological analysis locates the mental weakness in functioning in the same way that physiological weaknesses are located. Such points as the following are considered :

- a. Are responses under control, or are they made at an automatic level?
- b. Is there retarded apprehension with a low degree of awareness and weakness in the normal functioning of old learning?
- c. Is there divergence from normal in perception, in memory span, in speed of learning, in ability to fixate new data, and in the time required to grasp the meaning of a relatively complex situation?
- d. Is there a wide discrepancy between span and ability to integrate and learn new data?
- e. Is the response normally prompt and accurate; or is it quick with a tendency to make unnoticed errors; or is it quick and irrelevant?
- f. Is the response slow but thorough and normal; or is it slow and confused; or is it so slow that pertinent

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associations are not synchronized and meanings are not grasped at all? Is there a possibility that satisfactory adjustment can be made if sufficient time is allowed for establishing new habits?

- g. Is there such unevenness in the functioning of any one mental phase that it cannot be compensated for no matter how effectively the other phases may function?
- h. Where in the mental unit is the weakness? Is it in motor control? If so, is it in transferring the idea into action; or is it in the speed of the motor process after it has been initiated; or is it in continuous work in which energy is required to make constant successive responses to successive stimuli?

The mental organization of each person is unique in the relations between his level of intelligence and the functioning of its different phases. Consequently, each person offers a different problem. After the physiological and neurological condition has improved, mental problems can be solved only by applying the laws of learning to achieve re-education and remotivation adapted to the subject's assets and limitations in his social setting.

Axioms:

It is time for psychology to adopt a few axioms which might include the following:—

1. The human mind does not function without a human body.
2. A person does not do things for which he does not have the appropriate organs.
3. Persons naturally tend to do things for which they

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have organs. This includes thinking according to the stage of evolution of the brain.

4. Persons are not interested in things they cannot mentally perceive.
5. Development to higher levels of intelligence depends upon capacity to accomplish an increasing amount of mental activity with a decreasing degree of awareness.

CHAPTER XIII

INTERPRETING MENTAL EFFICIENCY ANALYSES

The Effect of Age: Level Controlled:

The high correlation of efficiency scores with level of intelligence and the fact that equivalent efficiency scores have different meanings depending upon the innate capacity of the individual tested is an added source of confusion in their interpretation. We have the apparent anomaly of a lower efficiency score often indicating better mental functioning than does a higher score. This makes it necessary to use some measure of abstract level as a point of reference in interpreting the efficiency of the border-functioning group in which malfunctioning is less marked than in extreme impairment. It is, therefore, important to control both age and level as may be seen by examining the figures in Table XLV, which shows the scores of four persons who all make equal efficiency scores.

TABLE XLV

**Different Degrees of Efficiency for Four Different Subjects
All Having the Same Total Efficiency Score**

| | CA | Level | Approximate IQ | Score | Norm | Diff. from Norm |
|----------|----|-------|-------------------|-------|------|--------------------------|
| <i>A</i> | 15 | 16 | 105 | 16.1 | 15.5 | 0.6 above norm for level |
| <i>B</i> | 15 | 12 | 84 | 16.1 | 13.4 | 2.7 above norm for level |
| <i>C</i> | 15 | 21 | 147 | 16.1 | 19.2 | 3.1 below norm for level |
| <i>D</i> | 12 | 16 | 132 | 16.1 | 15.5 | 0.6 above norm for level |

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A is of average intelligence and has an efficiency score 0.6 above the norm for his level. He is good high school material but is not high enough to warrant academic college work. B has low dull normal intelligence and an efficiency score 2.7 above expectations for his level. This indicates good trainability along practical lines because of excellent learning and memory combined with quick perception. However, if his capacity is not analyzed and properly understood, he is a potential problem, because of the tendency to think that he has much higher intelligence than he really possesses. A person of this type is apt to be a school failure because he is mistakenly judged to be of sufficiently high calibre to take academic work which he is incapable of comprehending. Graph VI¹ shows the mental profile of a similar case.

C has a very superior level of intelligence, but his efficiency is 3.1 below the norm for his group. He too is a potential problem, since his capacity will not be readily understood and he will have difficulty in adjusting. He is slow in perception and integration of data, but if he has plenty of time he will arrive at ideas of which persons of average and inferior intelligence are incapable. Careful attention has to be paid to his general health. He has capacity for college work but would be forced to proceed at a slower pace than average. He will probably make his best adjustment in work involving the handling of material immediately present to the senses, since this more readily holds the attention and lessens the chances of nervousness. Familiar routine work which does not require constant assimilation of new data is also possible for this type of functioning. D has an efficiency score 0.6 above the norm for his mental level. Although this index is the same as A's, D is excellent scholastic material while A is not. D, whose chronological age is *twelve* years, has a sixteen-year vocabu-

1) See Appendix.

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lary level, which indicates that he has superior potential intelligence, while his efficiency index indicates mental functioning better than expectation for both his age and level.

Effect of Mental Efficiency: Level and Age Controlled:

TABLE XLVI

**Interpretations of Different Mental Efficiency Scores in
Relation to the Norm: Level and Age Controlled**

| Efficiency Score | Vocab. | Norm | Diff. from Norm | |
|---------------------|--------|------|--------------------|---|
| 10.6 | 14 | 14.5 | 3.9 below | Extremely poor functioning; probably pathological case. Score should be analyzed. No re-education should be done without medical co-operation. This should probably be a preliminary in every case. |
| 12.5 | 14 | 14.5 | 2.0 below | Slow and poor functioning. Analyze to determine chief handicaps and assets. |
| 14.0 | 14 | 14.5 | 0.5 below | Normal and fairly typical. However, there may be abnormal slowness in some phase with compensation in some other. Analysis should not be omitted. |
| 15.0 | 14 | 14.5 | 0.5 above | Good normal score which may represent an alert type who is also careful and critical. The apparently good score may be deceiving, however, and analysis is important. |
| 16.1 | 14 | 14.5 | 2.1 above | Good efficiency. Score should be analyzed for over-quickness, which may be compensating for some significant weakness. |
| 18.6 | 14 | 14.5 | 4.1 above | An improbable Index. Examiner should check on method of timing, certainty of having obtained best possible vocabulary, and past history of patient with consideration of handicaps up to age 15. Check with other verbal tests. |

Effect of Verbal Ability: Efficiency Controlled:

Graph VI² shows the mental profiles of two subjects, who have practically equivalent efficiency scores, one of whom is average high-school material while the other is poor in abstract verbal capacity. If because of the high correlations with intellectual level the battery of efficiency tests were considered alone *B* would be thought to be as intelligent or more so than *A*, because of his quick perception and alertness. When we consider the abstract-verbal tests, however, which require discrimination of meaning — the kind that is a fundamental necessity to intellectual work — it is seen that *B* is not up to average although he makes average scores on some verbal tests in which time is heavily weighted.

Use and Limitations of the Efficiency Index:

An efficiency examination is a standardized test in itself, which can be interpreted as to degree of mental efficiency without knowledge of native abstract level. The Efficiency Index, the difference between an efficiency score and the norm for a person of the same level, is a convenience which is enlightening in border cases where there is little apparent abnormality. However, in great degrees of mental impairment of any kind, all mental ability, including recall of old familiar learning, is adversely affected so that, although the total efficiency score is valid, an efficiency index cannot be given, because there is no reliable way of determining the native intelligence. In such cases the index is not necessary to interpretation, because the malfunctioning is usually great enough to be evident from a patient's history.

An Efficiency Index can be determined at the time when quantitative measurement of mental status is of most value, as in problems of the normal population, of slowly deteriorating or only mildly impaired persons, of patients in the

2) See Appendix.

doubtful group, and of persons whose malfunctioning is at a stage when impairment is not obvious and can be detected only by scientific measures.

Mental Efficiency and Special Motor Defect:

The estimation of a reliable Efficiency Index demands that tests be given by experienced examiners who are aware of the fact that all verbal tests are not so standardized as to measure the same thing, and who can recognize when these tests are not valid measures of native intelligence. Inexperienced examiners have vitiated a great deal of what might have been valuable research because of ignorance of testing and failure to realize that certain rules and procedures which are valid in dealing with persons who have normal ability to recall, do not apply to abnormal subjects who may readily think of something at one time which they cannot recall at another time. This is particularly true of persons whose greatest defect is in the motor phase of response and who are often so slow in expression that pertinent ideas which could give clues are lost before the meaning is clear. Such subjects are less able to give reliable indications of native level and are subject to misinterpretations by inexperienced examiners who can not recognize the lack of validity of their verbal measures and may not even suspect the motor difficulties which interfere with expression.

Psychologists who are engaged in psychological diagnosis need wide experience with persons of different ages and different mental conditions. It is necessary to realize that reliable measures of differences from normal level depend upon the kind and degree of mental impairment as well as upon age of onset of pathological conditions and upon opportunities for learning. When it seems impossible to make such an estimate, a total efficiency score is valuable in itself because there are norms for different functioning levels and

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the degree and direction of changes in mental efficiency can be shown when an examination is repeated.

Significance of Efficiency Scores:

A difference of 0.3 from the norm in total efficiency on the mental efficiency examination is of some significance, depending upon the evenness of the scores of the separate phases. A difference of 1.0 below the median is significant and shows in personality type. As previously pointed out, only about one-fourth of the population score more than 1.0 below norms. This degree of inefficiency indicates a general slowness which may be related to generally slow functioning but may also be combined with good concentration, carefulness, and normal integration of data received; or it may be due to a mild dementia praecox type of functioning in which immediate memory span is proportionately much greater than the amount that can be assimilated.

To score appreciably lower generally indicates failure of the apperceptive background to function effectively. To score 2.0 below normal shows abnormally poor functioning, a type which may possibly adjust under optimal working and social conditions, unless unevenness of the profile indicates the presence of some one very great defect for which compensation is impossible. Persons scoring 3.0 below norms are greatly handicapped mentally and show the need of a very protective environment. They usually cannot adjust without constant supervision and encouragement, unless they are mature persons who live in familiar surroundings and are doing familiar things. Scores four or five years below norms indicate a definite pathological condition, as is shown by correlations with incapacity to work and adjust.

Interpretation of Scores of Normal Subjects:

To score at the norm or about a year higher indicates

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prompt and efficient functioning. However, even here all total scores need analysis, for some persons who score high may be so quick in some responses that poor concentration may be disguised in the total score. Persons scoring above normal averages usually can adjust well in both social and vocational spheres. It is not as easy to score very high in efficiency as it is to score very low, since scores at the upper end of the scale are limited by the simplicity of many of the tests and by physiological limits to the speed with which certain very easy tests can be performed. There is, furthermore, little chance of improving native efficiency, while disease or accident always tends to decrease efficiency of functioning.

Diagnostic differences in mental impairment may show in mild cases of mental inefficiency at a stage when discrepancies between the different functioning phases are more marked than they are in states of extreme impairment. Cases of catatonic dementia praecox, epilepsy, and cases of early stages of syphilis whose defects started in the motor area of the spine probably remain mentally clear longer than others who manifest a greater degree of general impairment.

Efficiency Index and School Children:

For a long time whether the efficiency of children should be estimated on the basis of norms for their chronological age or on the basis of norms for their abstract level remained in question. For average children of about 100 IQ, the differences would be the same. The mental efficiency of normally functioning children above and below average intelligence is close to the norms for their intellectual level rather than for their age.

Table XLVII shows the differences in median efficiency scores at different vocabulary levels in a normal group, of 12 CA.

TABLE XLVII
Normal Efficiency Scores of School Children
at Different Vocabulary Levels

| CA | Vocabulary | Norm | Median Score | Median EI |
|----|------------|------|--------------|-----------|
| 12 | 9 | 10.6 | 10.7 | +0.1 |
| 12 | 10 | 11.6 | 12.1 | +0.5 |
| 12 | 11 | 12.0 | 12.1 | +0.1 |
| 12 | 12 | 13.2 | 13.3 | +0.1 |
| 12 | 13 | 14.4 | 14.3 | -0.1 |

When twelve-year old children who are in the same grade were studied, results seemed contradictory since the pupils of higher levels (13 vocabulary) had poorer efficiency than average pupils, while pupils of lower intelligence (11 vocabulary) had better efficiency than average. This proved to be attributable to poor sampling of different levels in the *same* grade and to the fact that most of the higher-level pupils would have been advanced if they had also had equally good mental functioning, while the children of lower level would not have reached the grade if they had not functioned above expectations for their level.

Gifted Children:

It is necessary to judge young geniuses by their scores for the separate phases, since verbal-abstract-reasoning tests score high when such children have not yet developed motor speed above the norm for their age. This is not to be interpreted as meaning that they are poorer on motor tests. Rather, it so happens that the simple motor tests given are so fundamental and easy in a physical sense that children of low or average intelligence do them about as well as superior children. Superior children, on the average, tend to do all sorts of tests better, however, even those which stupid persons apparently readily understand.

Children Compared with Adults of Equivalent Mental Levels:

Adjustable adults of low abstract levels usually score higher in mental efficiency than children of equivalent levels, probably because of more years of experience in the use of verbal and motor tools as well as because of sampling, since the inefficient adults of low level are apt to be diagnosed as feeble-minded and are not examined in an alleged normal population. After 10 or 11 years of age the average child has matured in his ability to use intellectual tools, so that his intelligence begins to compensate for the lack of experience which, up to that time, had kept him from scoring as high in efficiency tests as adults of the same vocabulary level. Above 15 vocabulary, average scores for adults and for persons under twenty are practically the same, since both have the same IQ's.

The difference between the scores of adults and children of the same level is not surprising. There has never been any reason to expect that an adult of eleven- or twelve-year intelligence, who is about 80 IQ, could do as well in tests which measure the essentials of intelligence as an eleven- or twelve-year old child with the same mental age score, who has an IQ of 100. When intelligence tests are arranged with the idea that sub-normal adults should score the same as children of the same level, they must be heavily weighted on the efficiency side and weaknesses in ability to reason and abstract have to be ignored. Such a plan may be good from the practical viewpoint, since a person can adjust without a high capacity to reason just as he can adjust without much capacity for music provided he does not venture into fields beyond limitations. However, this method fails to disclose the true intellectual status of adults and fails particularly to do justice to adults of very superior intelligence who are not quick in functioning, since such measures are over-

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weighted on the efficiency side in which some very superior persons are handicapped.

Interpretation of Errors:

The question of errors is important. Errors should have separate consideration even though the problem of how to handle them statistically has never been satisfactorily solved. To do wrong things quickly does not show good functioning. High efficiency scores with no errors in easy tests show excellent functioning. High scores with some incorrect responses may denote good functioning with poor mental habits. The decision will depend upon general work in all tests. On the other hand, low scores with no errors indicate slow functioning, while low scores with errors show poor functioning with probable mental confusion.

Implications for Research:

Facts brought out by application of the Level-Efficiency Theory cannot be ignored in research. The unreliability of equating groups by intelligence tests, unless other tests are also used to show that subjects are equal in efficiency of functioning, is evident. Tests of general intelligence are probably never a reliable measure of normal level nor a basis from which to estimate mental malfunctioning. Hospital patients are usually definitely impaired, as is shown by the behavior which caused their commitment. As a consequence, they score lower in tests of general intelligence than they otherwise would.

Different groups of persons cannot be compared as to their mental status without control of both the level and the efficiency of functioning of each individual in the groups compared since these two factors affect learning and span and the output of any performance. Consequently, to try to show that one method of teaching, for example, is better

than another is fruitless unless the kind of mental functioning is known and the fact is recognized that one method may be better for some pupils and another method for others. Educational research must demonstrate the best methods of teaching individuals of different types of functioning and of different levels of intelligence. It is also impossible to ascertain fundamental differences between different clinical groups unless the comparisons are made between an equal number of individuals of equivalent levels and of equal degrees of deviation in mental efficiency from normal medians. Otherwise, two groups of subjects could have the same average on tests used to equate them and in the one group persons of slightly lower intelligence with good mental efficiency might predominate, while in the other group there would be more persons of higher intelligence and poor efficiency.

Psychological Analysis: a Report of Specific and General Conditions:

Obviously, a mental efficiency analysis does not result in a psychiatric diagnosis. It is concerned with the mental roots of behavior as shown by the functioning of underlying mental capacities, and not with external manifestations which might be due to intellectual and environmental conditions.

Such an analysis is of prognostic value in showing the degree and quality of malfunctioning and the direction in which change may be taking place when examinations are repeated; yet in states of mild impairment different factors may group themselves so as to indicate different recognized classifications which are more or less indicative of psychopathic states.

A psychological analysis does not determine the exact state of the underlying physical condition nor does it furnish

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a neurological diagnosis. It does, however, locate the phases of the mental process which are most impaired and so indicates the probability of neurological weaknesses with which the art of medicine may be able to cope.

It is a necessary preliminary to problems of adjustment, even those in which environment appears to be the potent factor. It shows whether a person has capacity to profit from environmental opportunities and can stand the strains of normal everyday life. It furnishes a foundation for advice and education by indicating how effective a person can be in making use of his potential capacities. It does not determine whether a person will be a criminal, a respected citizen, or an undetected felon. It does not even indicate whether a criminal would want to lead a normal social life if he could. It does help to indicate whether a criminal could change his way of life if he wanted to do so.

CHAPTER XIV

THE PLACE OF LEVEL-EFFICIENCY ANALYSIS IN PSYCHOLOGICAL THEORY

Summary of Theoretical Background: One General Instinct:

According to the Level-Efficiency Theory of mental organization, the beginnings of psychology are in life itself with the instinct to find expression through the bodily organs. This activity occurs in response to the readiness of different organs to act and to be attentive to specific kinds of stimuli. The type of response depends upon the particular organ which is stimulated. The drive however is in the energy of the living body and is ready to be diverted to any mechanism which has in some way been aroused. When energy is used by the undifferentiated part of the brain the instinct of intelligence functions.

To think of any particular one of the instincts as furnishing the drive to others is untenable. Energy like light takes its coloring from the medium through which it is refracted.

The instinct of intelligence is late in maturing because its full effectiveness depends upon the acquisition of skill in the use of the tools of thought, and the building up of a well integrated background of experience as a foundation for higher levels of thinking and as a basis for sound reasoning.

Sensory impressions are instinctive and though not mental in themselves, they open the doors to genuine mental functioning. By means of sensory impressions, the mind gains access to the outside world.

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The Two Environments:

All the factors on which the health of the functioning mind depends, including chemical, physiological, neurological conditions and the capacity for attention and memory, are common to all animals. They are not the significant characteristics of intelligence but they determine the conditions under which the human mind functions. They are therefore best thought of as *the mind's inner environment* on which the capacity for normal functioning depends. Activity which is characteristically mental is concerned with responses which are not fixed and invariable, and which differ according to particular problems and situations. Intelligent behavior is distinguished from mechanical responses by the capacity to be influenced by new factors and to make a new kind of response without previous practice.

Man's outer environment, inclusive of all experience and formal education, stimulates mental activity and furnishes both data for the mind to use and the mental tools which are necessary for the effective functioning and development of higher levels of intelligent behavior.

The socially effective mind requires both a healthy inner environment and the food for thought which the outer environment offers. It also requires periods which are uninterrupted by new impressions in order to give experiences a chance to become assimilated so that they can form an effective part of a person's mental assets.

Intelligence:

The underlying mental factors of perception and memory which are common to animal life in general are propaedeutic to the functioning of intelligence but not its distinguishing characteristics. The distinguishing factor in intelligence is the degree to which the abstract-reasoning-

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generalizing ability can function. After having once functioned with some degree of awareness, the memory of the experience becomes a part of the apperceptive background and influences subsequent mental activities. Physiological changes in fundamental instinctive organs which cause readiness to act are probably naturally dissipated unless there is a conscious response, the effects of which can influence later responses.

The characteristic which distinguishes the *bright from the dull* is the kind of activity that takes place between stimulus and response. It is in this part of the mental process that experience gives more meaning to stimuli and causes mental activity to be richer and more effective according to native capacity.

Advance to higher levels of intellectual development depends upon ability to use data of an increasingly subjective nature. This is impossible without ability to hold ideas in mind by means of symbols. Growth also depends upon ability to use mental units of increasing complexity. This is impossible without a broad, well integrated apperceptive background which can function with little awareness.

Different stages in the development of intelligence are shown by the uses which can be made of data perceived and remembered, and by the nature of the symbols used.

The Human Mind a Delicately Timed Instrument:

Time and verbal-abstract level are two mutually related factors which affect all mental activity and determine a person's effective intelligence. Individual tempo as demonstrated in efficiency of functioning is a general factor. The essential consideration is not simply a matter of the tempo of particular responses but is more concerned with their synchronization in reference to an idea. While the degree to which a person can abstract and reason is the essence of

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intelligence, the synchronization of pertinent memories which can function before a response is made is the characteristic which distinguishes the normally functioning mind from others. It is the key to sanity of mind. Abnormal synchronization of different phases is related to abnormal personality types, to maladjustment, and to insanity.

Optimum timing of the numerous associated activities whose co-functioning influences the response is impossible unless it is controlled by a normally functioning neurological basis.

Mental functioning becomes pathological when the background of learning is no longer under control and when the essentially human part in mental activity cannot make adequate use of the effects of its past experience. The characteristic of pathological mental states is not a resurgence of the kind of mental activity which man has in common with the lower animals. It is rather a lack of capacity of higher, more lately evolved mental abilities to function so as to control the mind's activities. In such mental conditions there may be automatic verbalization without preceding control. Too important a rôle has been attributed to such responses. They are not truly mental but are psychological anomalies which represent the functioning of only a part of the psychological unit. They are like the grin without the cat.

Instinctive Expression a Personal Evolution:

Although instinctive tendencies are the vital factors in behavior this does not mean that behavior follows fixed inherited patterns which function without training. On the contrary, the response phase is subject to control and education. All instinctive expression is a personal evolution in which the factors of intelligence, stability, and strength of the instinctive urges are inextricably mingled with the ef-

fects of experience. Such tendencies are not something to be "overcome" but are factors to be developed according to the need of the total personality in its social setting. Reasoning is not to be considered as contrasting with instinct, but as an instinctive tendency in itself which functions when it is sufficiently mature and when it is given necessary stimulation. The highest type of personality uses the reasoning instinct with other instinctive tendencies. Over-emphasis on the power of the earliest developing instincts, because of their frequent overt manifestations in border-functioning and deteriorated groups, and failure to appreciate the significance of lately-maturing capacities, has resulted in the concept of "repression" and has been uncritically used to explain the behavior of normally functioning persons. The fact is that the earliest developing instincts are less dominant among normal persons than is often thought, because of the competition between many different interests and the increasing demands of those which are later in maturing.

Behaviorism and Instincts:

If the behaviorists referred to "instincts" as tendencies with definitely fixed patterns of response — a mode of thinking long since out of date as regards human beings with their numerous conflicting tendencies and modes of possible responses — it would be possible to agree with their repudiation of the concept. Since responses do change according to conditions, the behaviorists were essentially sound in their emphasis on the fact that after birth, training and education — using the word education to include all environmental influences both consciously and unconsciously acquired — are of great importance. To acknowledge this however is a different matter from denying instincts *in toto*, and does not nullify the importance of original tendencies to special kinds of activity. It does, however, ignore lately-

maturing instincts. There could be no training without attention to certain stimuli and natural tendencies to some sort of response. If the only instincts were those of fear, hunger, and rage, and if there were no intellectual tendency and no intellectual organ ready to act without previous training, it is obvious that there could be no education.

Behavior and Environment:

Insofar as behaviorism was an attempt to bring to attention the importance of the effects of environment on behavior, it is to be accepted as a working hypothesis provided it is not carried so far in practical work that it blinds psychologists to the existence of innate capacities for which education cannot compensate, and to the constitutional defects which training can do nothing to alleviate.

Psychology Not Limited to a Study of Responses:

The method which has been used in the studies of mental efficiency is behavioristic in the sense that all the results reported have been obtained by recording responses. It does not follow however that because mental activity is incomplete without response of some kind, the science of psychology is of necessity concerned only with responses. While the initial idea of response psychology was based on recognition of the fact that it is impossible to study and understand psychology by direct observation of mental activity, the weakness of the theory is in thinking that the part which can be directly observed is all there is and in not seeing that the essential intermediate process can also be studied. Emphasis on something that could be worked with and expressed in quantitative terms was a progressive scientific procedure and a gain in that it tended to stop waste of time in trying to observe the processes of consciousness directly.

The fact is that responses which are outwardly alike may

result from entirely different kinds of mental activity. Differences which show in time alone usually mean differences of some kind in the preceding mental processes. Also responses which apparently result from the functioning of intelligence may be merely automatic habits preceded by a *lack* of normal inner activity which might in some way have modified them. In pathological mental conditions responses are often entirely disconnected from the kind of mental activity with which they were originally associated. Again, responses which have resulted from conscious thinking can be learned and even used by others who are incapable of such thinking. There may also be persons who show all signs of thinking, who know what they want to do or say, but who either cannot express this outwardly or only with the greatest difficulty.

Though stimuli can be controlled and responses can be recorded, the possibility that the same inner processes will be aroused by the same stimuli, or that different stimuli will produce different or similar responses, even in normal situations, will probably never be surely predictable. Consequently psychology cannot be restricted to reports of responses which ignore the most essential phase of the mental process — the phase which is important in the control of behavior and which grows increasingly complex as the level of intelligence rises.

The inner mental activity which determines the type of response finally made is spontaneous and cannot be directly observed, but it can be inferred from the problems set and the efficiency of the processes as determined by the time which elapses before an adequate response is made.

Psychology as a Study of the Capacity to Control Behavior:

If the behaviorists had paid more attention to intellectual differences, and if they had pursued studies of individ-

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uals of higher levels of intelligence, they might have seen that no matter how effective behavioristic methods may be for training and for simple types of learning they are not applicable to education at higher mental levels where meanings and the nature of particular problems are potent. Instead of seeing psychology as purely a study of behavior it might have been seen as a study of the *capacity to control behavior* — the utilitarian function which is responsible for the evolution of the mind. Intelligence might have been seen as the functioning of the organ which gives understanding and makes correct responses possible; and efficiency of functioning as a secondary factor which makes control difficult or easy. Thinking, instead of being regarded as laryngeal habits or muscular twitches, might have been seen as the activity of the prefrontal area of the brain when a habit response is not immediately made and before the laryngeal response takes place. Of course, even here the thinking may be in inaudible twitches, for there is certainly activity of some kind and the neurons and prefrontal mass must act in some way. The weakness in the behavioristic thesis is the failure to recognize the twitching — or lack of quiescence — of the most recently evolved organ, and the fact that it may be as important, if not more so, than that of the buccal cavity.

Introspection:

Although inner mental activity is the most significant factor in psychology, the probability is that it is no more possible to learn about mental organization from introspection than it would be to learn about chemical changes in the functioning of the body by a similar method. Given essential memories and the control of activity by a problem, the results of thinking merely happen with no realization of just how the responses come about. Why they occur can be

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explained only by the underlying neurological condition. Just how particular responses occur involves the whole problem of learning and recall. A person attends, perceives, remembers, reasons, recognizes, abstracts, and generalizes spontaneously, comparisons or generalizations coming to consciousness only after the functioning of nearly unconscious events which have brought them about.

Mental versus Mechanical Functioning:

Though conscious processes cannot be directly observed, this does not nullify their existence. Consciousness is a datum of experience about which too many persons agree to make its denial convincing. It is experienced when situations are not immediately followed by habitual responses and when there is delayed response. It is an occurrence which is essential to the development of higher intellectual levels which can function effectively. The conditioned reflex theory of learning loses its effectiveness at conscious levels because of other possibilities met during delayed reaction time. If there be a mechanics of the mind it is very different from the working of other machines because there are imponderables which result from unexpected combinations and from the inexplicable way in which appropriate associations are controlled by particular ideas and so become potent in response. This is made possible during moments of consciousness when associations with the effects of other experiences are first made. Learning and conditioning which are not associated with a problem or situation which is perceived with some degree of awareness represent a more primal type of learning and do not necessarily become so integrated with the effects of past experience as to be of use in general mental activity.

Psychology as a Study of Consciousness:

Psychology could well be considered a study of con-

sciousness, since conscious moments at some degree of awareness are essential to the integration of the effects of new experience with the old, if they are later to become a part of the machinery of a normally functioning mind.

The Unconscious Not the Controlling but the Controlled:

The effective use of the functionable past is possible, however, only when it is associated with and controlled by new present situations which make use of what is pertinent and which seem to have some way of ignoring the rest. Although, in habitual situations this does not seem to be true, even here there is an instant of awareness if the processes do not proceed as usual. This instant of awareness shows that the conscious mind has been functioning to some degree and that the unconscious instead of being the controlling element, *is the part that is controlled*. No matter how slight the degree of awareness, there must be a conscious moment in the apprehension of new stimuli, when likenesses, discrepancies, or general principles are recognized if they are to become a part of a person's intellectual assets. Although thinking leaves much mental activity to low degrees of awareness which can later function, unless there is some degree of awareness, experiences are merely automatic processes and do not become a part of the past which can affect subsequent mental functioning.

It is true that the conscious mind is very small compared with the large unconscious reservoir. It could not be otherwise, since the functionable unconscious results from the effects of all the preceding conscious moments. But this fact does not make the conscious moments of less importance. Even though the conscious part is momentary and gone as soon as a response is made, that very fact has affected the usable unconscious and has added to its richness.

Normal Functioning as the Focussing in Time of the Effects of Pertinent Pasts:

Consciousness might be defined as the sensation or effect which results from activity of the pre-frontal lobes of the brain when a response is not immediately made and before the appropriate pasts have functioned. Just as the experience of light results when certain light waves affect the brain through the eyes, so consciousness may result when activities occur in the forepart of the brain. We see when the eye functions. We are conscious when the frontal lobes function. And, just as we have good vision when light rays are normally focussed, so we have normal mental functioning when the effects of different pertinent past activities are focussed within an optimal length of time. When the effects of the different functioning parts are not so timed that they can affect each other and the total situation so as to produce a normal response, we have mental malfunctioning or even insanity.

Mental versus Neurological Functioning:

Associations between the effects of past experience and new ideas are essential to normal functioning. But since many associations must function sufficiently closely together in time, if they are to be mutually effective, and since there is a selection of appropriate activity by an idea, the associative processes are more definitely mental than are neurological processes in general, even though they depend upon the neurological system for their very being. The fact that this activity does not take place simply as a series of consecutive events, but occurs with many almost simultaneous confluent processes, is probably made possible by the undifferentiated nature of the prefrontal area of the brain with its jellyfish-like organization which permits free communication to all parts. The controlled effects of a complex of

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past experiences on response makes mental functioning a distinctly different process from the conditioned type of response and determines its nature as a mental event. Bizarre responses which have been noted in extreme mental impairment are more nearly neurological events since they are due to chance stimulation because the controlling mental element which selects the pertinent functionable past is missing. Insanity is a condition in which the past is not normally controlled, and in which individuals are left with only capacity to use chance words and phrases with no meaningful associations, or with natural tendencies which might have been active had there been no experience and learning.

Mental functioning is distinguished from neurological functioning also by the fact that the mind is changed by experience, and that after each experience it is a different responding mechanism with possibilities of different kinds of response than could previously have been made.

Although psychology and neurology have fundamental problems in which collaboration is important they constitute two distinct fields somewhat as do chemistry and physiology. Chemistry affects general bodily functioning rather than specific bodily activities. Neurology affects general mental functioning but is not specific in regard to activity which is essentially mental. The impossibility of determining neurological correlates of mental activity has been increasingly recognized. Aetiology in neurological terms may reveal special neuro-physiological conditions, but it can reveal only general mental conditions.

Gestalt Psychology:

Ideas against which gestalt psychologists rebelled are no longer influential in psychological thinking, except as they are reinterpreted and better understood. Mental organiza-

tion is no longer thought of in terms of mosaics of sensations or of other independent elements except when it is necessary to abstract different phases for purposes of scientific study. The idea of a constancy between immediate experience and local stimulation is seen to be inadequate to explain the data of psychology. If Gestalt psychologists had pursued problems of perception and learning at all levels of intelligence their work would undoubtedly have continued to be fruitful and inspiring. It might have been seen that perception cannot be studied irrespective of learning and recall, and that the thorough study of any one factor necessitates consideration of all the others. It might have been recognized that significant differences in perceiving wholes depends much upon the differences in intelligence of the persons doing the perceiving, and that *among normally functioning persons* gestalten differ both in complexity and kind according to mental level.

Perception is psychologically different from first, pure sensation because of the unconscious effects of past experience by which impressions are immediately interpreted. Persons of the *same level* of intelligence differ from each other in perception according to the efficiency with which their pasts can function. Persons of *different levels* of intelligence differ according to the kind of units which function with little awareness, as well as in their mental efficiency.

Studies of efficiency of functioning in which levels of intelligence have been controlled have strengthened the evidence of the gestalt thesis as to the greater significance of wholes over parts in perception, and the greater importance of relations between the parts than of the functioning of the parts alone. Good intelligence tests which show the development of different functions at different chronological ages and at different mental ages disclose much more about

mental organization than researches which are set up in artificial situations and without reference either to the effects of intelligence or of mental efficiency.

Though it is true that individuals are subject to adjustive stresses, the quality and functioning of the brain determines the capacity of individuals to meet stresses and strains. This capacity can be known only by determining the ability to comprehend problems, ability to learn, and the efficiency with which these capacities can function in relation to the environmental demands. There is increasing evidence which points to the conclusion that persons who can neither change conditions nor realize they cannot be changed, and who do not make some adjustment in the environment in which they are placed, are weaker in the neuro-physiological essentials for adjustment than are other persons.

The Mental Unit in Psychology:

The elements of psychology are not looked upon as sensations, feelings, or images, but as the mental activity which follows and interprets these phenomena and which helps to determine responses. It is a continuous process which functions with different degrees of complexity and at different levels of efficiency according to the effects of intelligence and of mental control. Though sensations which are followed by automatic responses may not be truly mental, a distinction is to be made between purely automatic responses and immediate responses which are due to practice and can be executed at very low degrees of awareness. If there is an instant of consciousness no matter how low the degree of awareness so that when the stimulus is repeated it can effect the new response if only to delay it for an infinitesimal moment, we then have what might be considered a simple mental unit which is a first stage of development toward higher levels of thinking. The kind of mental activity,

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whether comparing or reasoning or generalizing, may remain the same while the units are of different degrees of complexity and richness depending upon the three main factors: intelligence, experience, the later effects of which function unconsciously, and the efficiency with which a person can make use of his apperceptive background. That is, every response is affected by inherited capacity, experience, and the mind's inner environment as determined by physiological and neurological conditions. One may study optimal conditions of thinking, and controlled situations may be set up to prove that certain activity occurs under certain conditions. One may even get leads to follow by considering his own experiences in retrospect; but just how a general truth is suddenly educed from a wide variety of unlike facts will probably long remain a psychological and neurological mystery.

Research and Utilitarian Values:

Work in psychology during the past generation shows the soundness of the idea that if research is to be of value, it must be guided more than much of it has been by some utilitarian value, and that mental phenomena should be studied in a more natural setting. The most effective and beneficial work which has advanced the science of psychology has been that which was done along the practical lines of determining the growth of intelligence and the efficiency with which it functions. Studies of "learning" which are dissociated from any knowledge as to level of intelligence and capacity for adjustment remain sterile. The laws of learning which have been determined for us have afforded no clues as to the most important factor in learning: They have not revealed how learning is affected by intellectual level, how much of the apparent learning ability is due to

its fixation phase, nor how much is due to the quality of Intelligence.

The Stimulus Error the Corner Stone of Mental Development:

In consideration of the fact that at higher levels of intelligence more mental activity can be carried on without awareness, and that this controlled but unaware activity is definitely less in pathological mental conditions; also in consideration of the fact that it is this factor in mental functioning which determines level of perception, it becomes apparent that the stimulus error of the introspectionists is the very foundation stone of normally functioning intelligence. It is evident, for example, that we see a table as a table and a stove as a stove because the effects of all our past experience with tables and stoves are functioning even if at low degrees of awareness, and so permit recognition of concepts which have been gradually built up. If every perception necessitated a recapitulation of the gradual process by which a concept was arrived at, and if persons were doomed to experience their first impressions every time a familiar object was presented, intelligence could never develop so as to function at higher levels. The introspectionists set an impossible task in trying to have their subjects attend to processes which would naturally have dropped into the realm of the unconscious if their mental development had progressed normally. When a higher perceptual stage is reached, data of which a person has to be conscious at a lower stage drops out of awareness. Conscious attention to what is unconscious is impossible and the stimulus error is seen as a direct, honest observation in the realm of psychology. The thing seen is a datum of experience, whereas what is known to be visually present may not be experienced at all. With experience, perceptions grow in richness and build up a background which functions almost unconsciously.

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The results of this unconscious functioning in relation to stimuli are true psychological observations.

Intelligence as "Connections" of a Superior Kind:

According to the Level-Efficiency analysis, intelligence cannot be considered as amounting to chance combinations of different factors, nor as resulting from a large number of connections of the ordinary sort, unless it is specified that the factors may be of different degrees of complexity. The phylogenesis of the brain considered in relation to the facts of normal and pathological psychology indicates that the pre-frontal lobes furnish man with a thinking machine which accomplishes results that other animals cannot achieve. Efforts to educate an entire population have shown that persons of inferior intelligence cannot make connections between certain kinds of data, such as generalizations, because they are incapable of generalizing and cannot conceive of such concepts. Differences in intellectual ability are qualitative and are determined by the quality of the machines. As some pathological cases show, a person may function at a high intellectual level when the number of mental connections at his disposal is far below normal average. In spite of poor synchronization of the parts, and in spite of a limited number of available discrete memories such as is seen in some cases of extreme malfunctioning, the functioning of higher levels of abstract generalizing ability emerges as a distinct phenomenon.

It is probable that when different phases of mental activity are so timed that they can produce something entirely new in the course of mental development, we are dealing with a kind of neurological process which is now in an early stage of its evolution and which can mature only as it is enriched by the effects of experience. Instead of being the result of a larger number of connections of the ordinary

sort, higher levels of intelligence are characterized by connections of a superior sort. There may be the same number of connections or even a smaller number than persons of inferior intelligence form. It is the quality of the connections which can be made by persons of higher levels that is important. This quality in the use of raw data is probably the general factor which Spearman recognized. It is a factor which makes characteristic use of all data within the range of perception.

Level-Efficiency Theory in Relation to Gross' Primary and Secondary Functions:

The occurrence of associative activity which is particularly appropriate to problems, together with the increased unawareness of the functionable past, are findings which are essentially in agreement with Gross' physiological theory of primary and secondary functions. He considered the arousal of the conscious idea the primary function, and the unconscious persevering effects as the secondary function. According to the Level-Efficiency view the primary function corresponds to the idea or problem which stimulates appropriate associations. The efficiency with which the effects of past experience can function corresponds to the secondary function. The "heightened" duration of the secondary function to which Gross refers is caused by the slow-functioning type of response which the studies in efficiency of mental functioning have disclosed. The duration of the secondary effects is coincident with the lack of interfering associations. The adjective "intensive" seems to apply to slow-functioning persons who still function within normal limits and whose lack of speed affords time for better-considered thinking.

The type described as having "diminished duration" and "broader consciousness" corresponds to the quick type with

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its increased associative activity. When the quickness is pathological, associative activity which appears to indicate breadth is uncontrolled and indicates breadth of out-put rather than breadth of mind. Applying the Level-Efficiency view, everyone exercises both the primary and secondary functions. The kind of idea of which a person is aware in the primary function differs according to intelligence and the ideas a person can understand. Differences in secondary function are due to efficiency of mental functioning which determines whether the primary function will be normal or pathological. Any extreme deviation in efficiency can result in non-sane behavior. Excited phases of insanity are due to over-quick associations. Quiet apparently-not-interested types of insanity are slow in their mental activity. From the viewpoint of scientific psychology insanity — using the terminology of Gross — is a mental condition in which the secondary function is so pathological that the primary function also is not normal. It is a matter of extreme mental malfunctioning in which the effects of appropriate past experiences either do not function closely enough in time or, as in the case of mania, in which there is much mental activity but *appropriate* associations fail to function.

Psychological Types:

Separation of people into different personality types is usually due to observations of behavior which correspond to combinations of different degrees of mental efficiency with levels of intelligence. Jung's introverted and extraverted types obviously correspond to the too-slow and too-quick subjects whose functioning is not sufficiently extreme to warrant the classifications of psychotic. Roback's classification into sounds and surds¹ however is not one of contrasting types of functioning, but distinguishes between *normal* and

1) Roback, A. A., *The Psychology of Common Sense*, Sci-Art Publishers, Cambridge, Mass., 1939.

pathological functioning. The "sounds" who are described as having self knowledge and self criticism are persons with normal functioning. The "surds" who are described as steeped in the subconscious belong to the malfunctioning type who are weak in ability to control their functionable parts in new situations.

From the time of Kraepelin, studies of contrasting types of personality have resulted in a later breaking up into many sub-types and mixed types. This inexactness is a natural result of classifications made from observations of behavior without ascertaining the underlying mental conditions which function at different degrees and in different combinations. The mixed types result from unknown combinations of low, average, or superior intelligence, with superior, normal, poor, or extremely poor efficiency of functioning. Because of these unrecognized and unmeasured causes of abnormal behavior it is not strange that lacking scientific estimation of the two important underlying factors — level and efficiency of functioning — efforts at classification should fail except when deviations are extreme.

The Level-Efficiency Concept a One-Factor Theory:

The Level-Efficiency view is fundamentally in agreement with Spearman's two-factor theory though it has been reached by a different road. The two factors are the abstract-verbal level which corresponds to Spearman's education of relations and correlates, and efficiency of functioning which is the outward manifestation of the energy available to the neurological system. It is more exactly a one-factor theory however, the one factor being the abstract-verbal ability, the functioning of which depends upon energy. This energy itself depends upon the underlying physiological and neurological condition which determines the conditions under which the one factor functions and the effects of which

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is shown in synchronization of the mental processes. The high correlation between general intelligence and energy is undoubtedly due to the fact that potential intelligence cannot function without energy, and that energy in general, together with the condition of the neural basis, determines the time aspects with which intelligence has substantial correlations.

Special Abilities:

Special abilities result from differences in kind and degrees of sensory discrimination united with degrees of expertness in making appropriate motor responses. At the basis of musical ability, for example, there must be special auditory sensitivities and also expertness and skill in some kind of motor response according to the instrument which is used for musical expression whether of the vocal chords or the hands. However, even if there is a high degree of both sensitivity and motor skill, the chances of musical success will be limited or increased according to a person's intelligence and the efficiency with which it can be used.

Judgment a Complex Factor:

The Level-Efficiency view does not conflict with even the old faculty psychology, but instead it furnishes a better understanding of complex traits which were observed and named before the value of considering more basic mental elements, which function in all faculties and are not easily isolated, became apparent. Judgment for example is a datum of immediate experience which is seen to differ in different people. That does not mean however that it is born full-fledged and ready to function. Mental processes above the reflex level need time for maturation. A complex factor like judgment depends upon experience for its full development. It was formerly treated as a unitary trait because of failure

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to consider that good or poor judgment depends upon the functioning of other more fundamental factors. These include memory span, since some impressions must be kept in mind long enough to stimulate succeeding mental activity; functioning of data pertinent to the problem to be considered, since knowledge of the essential facts is necessary for any adequate judgment; and level of intelligence, since the person judging must be able to understand the problem; and the efficiency with which these other factors can function. This implies the functioning of the residua of all pertinent conscious and unconscious experiences within a normal time limit so that the effects of one idea will not fade before others become effective; and *per contra*, so that a response will not be made before suitable connections have had adequate effect. Judgment would fail entirely if a problem faded from mind in the midst of the process — a situation which is often encountered in senile deterioration, and which tends to happen in some conditions of mild impairment.

Since judgment is a complex mental activity which is dependent upon intelligence, knowledge, and the efficiency with which these can be utilized, the term "good judgment" is meaningless, if the level at which judgment functions is not known. Behavior which is referred to as "good judgment" is often merely learned habitual response to familiar situations and would not be adequate in new and different situations. *Capacity* for valid judgments can be measured. To learn the *probability* that a person will have good judgment in a particular field necessitates ascertaining his knowledge about the particular subject. The effectiveness with which a person can use his innate capacity and his acquired knowledge depends upon how well he can control his mental processes. This means that level of intelligence and efficiency of functioning are the two essential factors in capacity for judgment which cannot be acquired by experience.

The Role of Purpose in Mental Organization:

Since purpose cannot create ability which does not potentially exist, it cannot be considered an essential factor in mental organization. Purpose results from a combination of many factors which include health of the neurological system, level of intelligence, special combinations of abilities which determine the fields in which a person has a chance to succeed, environmental factors which influence the form purpose may take even though it may not always be consciously expressed, and efficiency of mental functioning, which affects ability to persevere and the probability of sufficient success to insure continuance of effort. Purpose can be strong or weak at any level of intelligence. A person with a well-defined purpose tends to accomplish more than others, as a result of which his apperceptive background is more enriched and the breadth — not the level — of his general intelligence is increased. Other things being equal, the person with the most energy and the most definite aims will have the most effective intelligence, while other persons may give little evidence of their potential capacity. This fact partially accounts for situations in which intelligence without any definite aim permits mediocrity with a strong purpose to rule the world.

The weakness of the idea that purpose is the essential factor in mental organization is that it ignores the matter of constitutional incapacity and assumes that there are no individual differences except in degrees of striving. This idea is not far removed from the basic principles of "Science and Health" in the type of reasoning used. Undoubtedly, if there were a world in which people were bred so that all would have equal intelligence and health, purpose would become the sole criterion of differences in mental ability. Any less essential factor easily comes to be considered all-important in homogeneous groups, since if the other factors

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are equal, it is the only source of significant differences in ability. In fact if all other things were equal, the person who had the greatest capacity for feeling would seem to have the greatest ability.

After a certain age and given a certain minimum of intelligence together with a sufficient degree of awareness of events, it is even possible to control conditions so as to influence one's own future. In this sense, we could have free-will psychology and the person with the strongest will would have the greatest effective ability. But this too would be true only *within the framework of a person's intellectual development, his functioning efficiency, and the limitations imposed by the inner and outer environments.*

Character:

Character is another lately-maturing phase of personality. The concept refers to an inner consistency of conduct which is controlled by the acceptance of some underlying principle which determines choices between two different lines of conduct. Character is not an intellectual trait. It may be strong or weak at any level of intelligence although the effectiveness of its functioning from a social standpoint will differ in degree according to the type of principles a person is capable of understanding and according to the clarity with which he can give them expression.

Choices of conduct which determine character need not always be expressed in words nor be clearly conscious. If a child has accepted the idea of obedience to his parents as his standard, and if he adheres to that standard when two lines of possible conduct make the choice difficult, he has as strong a character as does the adult who resists bribery when it would seem to be to his advantage not to.

The highest type of man has superior intelligence and has had sufficient experience to develop strength of

character. He is also of sufficiently normal functioning to carry out purposes consistent with his adopted principles. It is customary in speaking of character to think of other traits which affect personality and are not essentially character traits. Although honesty for example is to be expected from persons of strong character, habits of honesty are not necessarily proof of character. Whether or not there is character back of the honesty depends upon its cause. Habits may be parentally imposed, and society may not have offered opposing attractions. On the other hand it is possible for character to show when conduct follows habitual patterns, and when the very lack of hesitation between opposing possibilities indicates that a principle is so firmly established as the criterion of conduct that it has become the invariable standard of choice and behavior.

Besides not being an intellectual trait, character is also not a matter of temperament which is itself due to underlying constitutional conditions. Character can be strong or weak irrespective of whether a person is apathetic or nervous, energetic or lacking in drive, dominant or submissive. This is true however only when persons function within fairly normal limits.

Type of Functioning and Character:

Although the temperamental and functional tendencies are not character traits, they do affect the final strength and effectiveness of character. Persons who are too quick are apt to do things which they will later regret. This weakens their character in that habits which follow accepted lines become less firmly established and character is on the whole less dependable. The too-slow type of person tends to procrastinate too long and his behavior is not as often controlled by his principles. As a result he too does not form as many firmly fixed habits which are consistent with his ac-

cepted principles. A dominating person may have unusual mental efficiency and a strong character but if love of domination too often controls his behavior at the expense of his principles, his character becomes proportionately weakened. A submissive person, if not too submissive, may be more pleasing in more situations than are other persons, but he may please others so often that he does not develop in strength of character by as many choices which are determined by his principles. As a consequence, he too may not make as many unhesitatingly consistent responses, and because of this his character is correspondingly weak. Character can not be judged by separate acts, but is determined by the consistency of many acts. Persons of the strongest character are the ones who have superior general intelligence which permits the grasp of problems, who have lived the most and who have met so many different situations that behavior according to accepted principles becomes a habit response which is unhesitatingly made.

Character a Positive Quality:

Character is often thought of negatively, as if it meant inhibiting or reining in or repressing other stronger tendencies. It is actually, however, a positive factor in personality. It is a higher-level habit which as it grows takes on instinctive-like traits of determining the data in which there will be interest and to which one will attend. It implies a habit of noticing what will lead toward an accepted line of conduct and of ignoring other attractions. It grows through doing rather than through resisting, desire and choice having gradually learned to work together. If young people lead a too sheltered life and do not have opportunity to make choices between opposing lines of conduct they have no chance to develop their potential strength of character, and it can probably never be as strong as it otherwise could have

been. Character, although a psychophysical disposition, can probably be best evaluated in terms of "regulative principles"² which in reality precede and determine the nature of the effect instead of being the resultant of the multitude of experiences to which man is subjected.

Though character itself can not be measured, it is possible to measure some of the underlying elements. It is possible to determine whether or not a person has capacity to understand and accept principles of conduct; the kind of principles he is capable of understanding; and whether mental functioning is sufficiently normal to make it easy to behave consistently with such principles. Such measures however would not tell whether or not a person's life was being conducted according to any approved principles. Tests of ethical judgment correlate highly with intelligence but they give no proof of how a person would behave under the conditions indicated in the tests.

Neuroticism and Character: Normal Persons and Psychoneurotics:

House's³ study made a valuable contribution which has not received sufficient attention among persons working with border-functioning subjects. In this study it was found that psychoneurotic subjects reported a smaller number of neurotic responses before the age of fourteen than did the normally adjusted group. Either the psychoneurotics were so well cared for that they had had little opportunity to know worry and doubt, or they were not as capable of such experiences. The probability is, as is brought out in the efficiency studies, that they were constitutionally less fit from early childhood and were more sheltered or excused than the average person.

2) Roback, A. A., *The Psychology of Character*, Harcourt, Brace & Co., (3d ed.) 1931.

3) House, S. D., "A Mental Hygiene Inventory," *Archives of Psychology*, 1927, No. 88, New York.

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The normal population on the other hand, which reported more psychoneurotic traits in their childhood and a smaller number in adult life, had evidently thought things out at a more or less conscious level during childhood and adolescence, and had consequently gained in understanding and had made adjustments consistent with their total life situation and their guiding principles.

Among the contributions with which Levine⁴ credits Freud is that of impressing upon people the necessity of cushioning the impact between wish and reality by so modifying the environment as to make for painless adjustment. Application of this principle may be suited to neurotic persons who, as we have shown, are weak in capacity to make their own mental adjustments and who need a favorable mental environment if they are to survive socially. Their situation is analogous to that of sick persons who must have a favorable physical environment, and of feeble minded persons who must have a favorable school environment since they cannot thrive on scholastic work beyond their powers of comprehension.

Obstacles the Sustenance of Developing Character:

The sheltered-cushioned-life treatment is far from sound however when applied to normally functioning persons; and when it is made into an accepted pedagogical law it is altogether pernicious in its effects. The development of character is dependent upon the constant adjusting of aims and wishes to conditions that are far from ideal. This demands venturing boldly into the storm, sailing as close to the wind as possible, tacking when necessary but never deviating from the main course. The very essence of character growth lies in meeting obstacles intelligently. When the impact with

4) Levine, A. J., *Current Psychologies*, Sci-Art Publishers, Cambridge, Mass.

life is cushioned, a person is deprived of the food his developing character requires.

The Level-Efficiency Concept and Psychoanalysis:

It is apparent from the foregoing that there is little in common between the underlying ideas of psychoanalysis and the scientific psychological analysis of personality. Except for the fact that some scientific circles take Freudian ideas seriously and have even helped to popularize them until they are made use of to explain most of the facts of life including history, art, literature, genius, marital happiness and enuresis, there would be little point in referring to his work in this discussion. But a cult cannot be ignored that has become so intrenched in the popular mind that a person of repute can state as an accepted and incontrovertible fact that Freud is one of the four greatest men the world has produced because "he invented the process by which we can understand psychology." It seems time to rise and state that it is more probable that Freud invented a method by which psychology is more misinterpreted and misunderstood than could have been thought possible in this scientific age. It is also a method so flexible in its interpretations that the data can be used to prove anything. Attention can well be directed to facts often mentioned but never sufficiently reiterated and emphasized, namely, that Freudian theories and "insights" are based on hypotheses which have resulted from observation of persons who would not have consulted physicians if they had not been different from normal persons. The resulting hypotheses have not been checked under controlled conditions.

Furthermore, there is increasing evidence to show the inherent weaknesses of psychoanalytical tenets. In this connection we must refer to the early studies of differences in intelligence tests and to the results of studies by Holling-

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worth⁵ and Tendler⁶ which showed that malfunctioning persons have generally lower intelligence than normal individuals. More recent research has shown that the lower intelligence of neurotics and mild schizophrenic cases is caused by weakness in the efficiency phase of mental organization rather than in ability to abstract and reason.

Applied Psychology and Mental Advisors:

The popular acceptance of the concepts of Freud and his followers undoubtedly is due to the increase of strains caused by the complexities of modern civilization that make adjustment more difficult for people today than at any previous time in history. This has made it necessary to have non-medical advisors and has stimulated the growth of a new profession. Work in the field of normal psychology has been taken over by school psychologists and vocational advisors. The field which does not come directly under the head of educational and vocational advice fell into the hands of the medical profession as was natural from the historical viewpoint, since there had formerly been no scientific psychology and the medical profession had always dealt with definite abnormalities such as feeble-mindedness, mental deterioration and insanity.

In the early days of psychology there was no recognition either of *borderline intelligence* or of *border mental functioning*. The fields were practically unexplored and knowledge was limited. Medical help of some kind offered the only chances of improvement in cases of known organic origin and of extremely poor mental functioning. However there is evidence that most mental patients including the border group cannot acquire normal functioning but can be better understood and can often make satisfactory adjustment.

5) Hollingworth, H. L.. *The Functional Neuroses*, D. Appleton & Co., 1920.

6) Tendler, Alexander, "Mental Status of Psychoneurotics," *Arch. of Psychoneurotics*, No. 60, 1923.

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Even paroled patients do not measure up to normal persons of equivalent mental levels, and a study of the history of "non-organic" maladjusted cases furnishes evidence of mental weakness which had probably existed from early childhood and even from birth. Obviously, only eugenics and prevention of unfavorable congenital conditions could have been of any avail in such cases. When such patients reach a hospital it is usually too late for medical help to be effective and the only hope for their successful adjustment is in furnishing a favorable environment.

What that favorable environment may be, can be decided only after a scientific examination of the patient's mental condition by a psychologist, since medical doctors have no means of appraising such conditions except by making a study of the life history and the peculiarities of behavior. The education of a medical doctor is not of a kind to aid in the interpretation of mental measurements. It has become increasingly apparent that all mental problems belong in the province of psychologically-trained persons and that some of the absurd advice and theories which in the past have been uncritically accepted would not have had a hearing if the fields of psychology and medicine had been more clearly defined.

Only when reports of outward behavior are correlated with behavior in *standard situations*, and when level and efficiency are controlled, will there begin to be a great increase in knowledge of the nature of the relation between neurology and psychology. It is probable, however, that there will never be any correlation between separate parts of the mental processes and specific neurological functioning since *the very essence of that which is mental lies in the possibility of unfixed and unpredictable responses as they are controlled by new total situations.*

Sex and Education:

The Freudian movement has been given credit for its emphasis on psychological problems of sex, with its frequent interpretation of abnormal behavior as due to tension between sex urges and social standards. This was originally coupled with the naïve idea that all activity is some manifestation of sex instead of being due to the one Protean life instinct which expresses itself through the different organs of the body. The importance of sex has been well recognized since the dawn of history as is shown by the numerous taboos and customs, which seem to have been an intelligent way of handling the problem. People adjust to different customs because of unconscious acceptance of the rightness of the ideas inculcated by their society. These ideas preclude expectation and lessen mental stimulation to the sex impulse. When there is no expectation of sex gratification until a definite age or until marriage, sex is not so dominantly forceful except for chance experience, and neuroses and other untoward manifestations of behavior are not apt to develop. Even in the field of sex, education and training and resulting physical and mental responses have great weight in a normally functioning population.

It is easy to understand why the peculiarities of malfunctioning persons are often attributed to tension between early developing instinctive tendencies and the more lately maturing instincts when the appreciable degree of malfunctioning which has been demonstrated among border psychotics is known. The incapacity of the brain to lessen and control the effects of the thalamic radiations of sensory stimuli, which would include sensations associated with the sex instinct, is another contributing factor.

The general effect of psychoanalytic dogma has been to ignore the plasticity of the human brain and the mind's susceptibility to education. It also ignores changes which ac-

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company satisfaction of the sex instinct as the personality develops with the growth of intelligence and the maturing of aesthetic appreciation and social aims.

"Reason Dethroned":

The alleged Freudian achievement of dethroning reason from the place of supremacy ascribed to it by the eighteenth century philosophers was a change of thought which was well under way before the Freudian influence in the misinterpretation of psychological events had begun to be felt. There was already a growing realization that ability to reason, far from being a purposeful and controlling force in itself, is merely a mental tool as are perceiving and remembering, to be used when it was needed.

Reasoning considered as a mental process which develops with experience into increasing ability to arrive at sound conclusions does not imply that it should function when no problem is involved and when habitual behavior is apparently adequate. Also, although the amount of reasoning required to conduct our daily life is less in amount and less conscious than was once hopefully thought, a belief that the effects of learning and experience are correspondingly impotent and that mankind must be governed by primal instinctive tendencies is not the necessary alternative.

When the process of reasoning causes behavior which is inconsistent with former behavior and which is contrary to a person's accepted principles, it shows the effects of either the wrong kind of education or it indicates a condition of mental malfunctioning which makes it difficult to weigh the pertinent factors essential to a consistent response.

Reasoning an Instinct:

Reasoning does not belong in the same category as striving and purposeful activity. It is an early developing instinct

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which gradually grows in capacity and is best understood as one of the functions which the striving individual may if necessary use to attain his purposes. No capacity is constantly at work. The instinct to satisfy hunger, to seek protection from danger, to show signs of fear and rage, and numerous other responses which are occasionally useful to humanity, function only infrequently. Yet under certain circumstances all the instincts including the reasoning process can be over-exercised in relation to individual needs. Habits of reasoning and arguing are often acquired early in life, and time is spent in philosophical discussions with repetition of the same ideas and arguments which, when augmented by no new point of view or added information, may be as harmful to mental health as the habit of over-eating is to physical health.

Interest in mental hygiene, in problems of personality, and in study of the first years of life had been steadily growing before the effects of psychoanalytic teachings were felt. Controlled observations were being made and experiments were being conducted which were leading toward an authentic understanding of mental development and the course of mental impairment as they are related to behavior.

A True Difference Between Normal and Border Functioning:

In view of the misunderstanding it has caused in regard to normally functioning persons, the alleged Freudian achievement of having removed the barrier between the normal and the abnormal is a doubtful success. Psychological studies had previously shown that mild states of malfunctioning differ from states of normal functioning in degree of mental efficiency rather than in a difference in quality. The theory of evolution with its emphasis on gradual change had made such ideas readily acceptable. And the fact of gradation rather than distinct differences between

types had been an epochal discovery in the differentiation of the feeble-minded from the normal.

Before the time of scientific measures, and before the intermediate range of intelligence was disclosed, the borderline *mentally deficient* group had been considered normal and their social and educational failures had been explained in many ways but not as due to a lack of intelligence. Freud, using an opposite reasoning process in the field of *border functioning* (measures of efficiency of mental functioning not having been devised) ascribed the traits of neurotics to normal persons, and used his illogical conceptions of the meaning of neurotic characteristics to interpret normal behavior.

The resulting trail of misunderstanding is still with us.

Failure to grasp the idea that constitutional incapacities denote real differences in ability, and the resulting misinterpretations and distorted ideas by means of which the normal mind has been misunderstood, naturally led to the conclusion that open display of peculiarities of thought and action were the cause of conditions of which they were really the result.

It is true that the same kind of forces are at work among both normal and neurotic persons, and that the life force in both groups is functioning through bodily channels. In the case of neurotics however the mental organs through which the life force works are weak and the output is variable, undependable, and on the whole less than that of normal persons. In spite of the likeness between psychoneurotics and normal persons, studies in efficiency of mental functioning show reliable differences between them. These differences indicate that the mental incapacity of the former precludes them from throwing light on the thinking of normally functioning persons, and that psychological laws built on such bases are necessarily unsound. Failure to recognize differences which really exist between normal and neurotic

persons is the chief cause of the misinterpretation of the neurotic personality. To infer that the discovery of gradation of difference means that there is no true difference is a logical blunder which has had harmful consequences.

The Freudian Unconscious a Mirage:

It is also easy to understand the emphasis placed upon the power of the unconscious when it is realized that there is no normal activity without much unaware functioning. The evidence thus far indicates that the unconscious which Freud pictured was a mirage. It was the reflection of his own thought processes and of deductions which were based on incomplete knowledge of the behavior under observation. The inference that there was great power in the reservoirs of the mind was natural under the circumstances. It is a kind of inference which is to be expected of persons who are not familiar with normal psychology, who tend to think of psychological events as entities, and whose rich imaginations are not checked by controlled studies. Such a view is a natural result of failure to take into consideration the fact that the development of both normal intelligence and normal mental functioning depends upon the unconscious functioning of the effects of past experiences.

The techniques employed in psychoanalysis, whether free association or dreams or suggestive questioning, can give only chance hints of the importance of past experience and are of little value as compared with the scientific determination of a person's capacity as related to the demands made upon it. Even the help to be derived from "talking things out" which is often of value to normally functioning persons is to be questioned when the results are interpreted without knowledge of either the development of the normal mind or of the degree of incapacity to be expected in different kinds and phases of mental malfunctioning.

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The Real Unconscious:

The view of unconscious activity which is gained when intellectual levels are controlled shows it to be the same unconscious with which educators and practical persons have always been familiar. It is an unconscious which is the result of past experiences that have had an effect upon subsequent experiences and responses. The power, however, is in the conscious grasp of ideas in which there exists the capacity to determine which past experiences will function.

A good case could be made for a psychology of the unconscious because the development of normally functioning higher intelligence does depend upon the increasing complexity of the units used in thinking which is made possible only through the relegation of an increasing amount of work to the unconscious functioning. As was pointed out, however, although there may now be no clear awareness, this unconscious foundation is nevertheless controlled by some idea or problem which requires conscious mental functioning. This is easily demonstrated by the number of associated ideas which arise when a subject is mentioned. The belief that the unconscious is the real driving power is another example of the type of reasoning which mistakes results for causes. Since behavior becomes erratic when it is not under control, that is, when the normal mind fails to direct its force in definite pertinent channels, what is usually thought of as the force of *the unconscious* is better described as the *inability of the conscious mind to make use of its apperceptive background*. In such circumstances, neurological habits run wild and are meaningless, except for a chance revelation. The real driving power is a conscious problem with purpose to carry it through.

Normal Unawareness versus the Pathological Unconscious:

Normal mental activity in which there is much mental

functioning without awareness is different from the pathological unconscious. In pathological mental conditions, it is often literally true that the left hand knoweth not what the right hand doeth, owing to weakness in associative functioning which retards or prevents recognition and recall. The normal mind however, is not truly separated from its unconscious mental activities but can become aware of them whenever necessary. It is not lack of any consciousness, but is better interpreted as consciousness held in abeyance as if it were temporarily dropped out of consideration. Pathological weakness may be so marked that there is no stimulation of the associative activity which is essential to the co-functioning of mental processes which are requisite for thinking. On the other hand the absolute unconscious — there probably is no absolute unconscious except in stupor and death — is a negation of all that can be considered mental. Under such circumstances, even when verbal responses are made, activity is merely a neurophysiological process.

Mental Therapy and Consciousness:

To think of the conscious mind as of little importance is to ignore the essential factor in maturing intelligence. Freud inadvertently offered some evidence to this effect when he announced the discovery of a lack of success in using the method of hypnosis as compared with the method of talking things out. It is probable that whatever help patients derive from interviews lies in the fact that they are encouraged to think their problems through and to bring different aspects to clearer consciousness. This explains the failure to obtain successful results when analyzing psychotics and persons of low intelligence. In these cases the only hope of satisfactory adjustment lies in the establishment of habits which are commensurate with intellectual level and individual functional efficiency.

The Functionable Past a Unifying Concept:

When the unconscious is thought of as the functioning of the effects of past events and when it is considered that this effectiveness differs in degree in both normal and abnormal persons, we have a general explanation which helps in the interpretation of many personality deviations. A "split personality," for example, is a malfunctioning mental condition in which mental connections between new situations and former experiences are not normally made. Instead of a "split," there is failure in the creation of new thinking such as occurs when an idea unites with the effects of appropriate memories and produces something entirely new which will itself affect new responses and also enrich the apperceptive background.

When dreams are interpreted as disguised satisfactions, the true cause is apt to be in the greatly exaggerated effects of physical stimuli when, as in sleep, the forebrain is not functioning normally. Because of this, we see the functioning of chance experiences which are neurological rather than mental since no conscious problem controls the associative activity. Such experiences may have been of no significance in conscious life and may never have fitted into any particular line of thought.

The general impression left, after having noted how far removed the true conditions are from the picture offered by the psychoanalytic schools, is that Freud's amazing insights are truly amazing but not always insights. To the psychologist they seem as crude as a psychologist's pronouncements might be in the medical or any other field in which he had had no education or training.

Mental Mechanisms and the Normal Mind:

It is probable that the mental mechanisms which the Freudian movement has emphasized are among the most im-

portant of the observations and contributions: not, however, in the way they were considered to be important; not as keys to the neuroses or other border pathological conditions, but as modes of mental behavior into which intelligent and normally functioning persons are apt to fall unless they have acquired a habit of being self-critical and of checking on their modes of thought.

Projection and Identification:

Mental mechanisms can be best understood in the light of their development. It is easy, for example, to suspect a person of doing something we ourselves might do, or might once have done, and so to have a clearer understanding of the possible motives back of it. It is also natural and easy for a person to identify himself with others who have the same faults and who tend to make the same kind of mistakes that he himself makes. To be able to identify oneself understandingly with others is one of the early steps in normal progress toward understanding people. The capacity is of little use to anyone however if it acts automatically. In normally functioning persons it must be united with a habit of seeing the possibility of being wrong and of not jumping to conclusions or of failing to consider the possible existence of different factors in two somewhat like situations.

Fixation:

Extreme attachment to persons with whom there has been close association from early childhood is natural. If in a normal social milieu such attachments become so marked that they are looked upon as fixations there is almost invariably mental malfunctioning which has interfered with normal development of interests, and has permitted less opportunity for making a normal number of attachments.

Transference:

The mechanism of transference is best understood as a result of propinquity and interest in the only available man (or woman or friend). If the liking expresses itself excessively and in a manner not in keeping with normal social usage there is usually a marked degree of malfunctioning and peculiar behavior.

Any complex is best understood as a mental habit which has resulted from learning and the influence of environmental factors and is united with a lack of adequate mental control. Complexes are apparently strong or weak according to the type of mental efficiency and the facility with which thinking can be accomplished. Intelligent persons who have normally functioning minds do not show inferiority complexes which force them to some extravagant behavior as a way of compensating for their weakness. The repeated evidence of peculiar fixed modes of thought in such cases indicates a mind that cannot grasp all the implications of a situation.

Compensation:

Compensation can hardly be considered a mental mechanism. The concept has two quite different usages. One is when it means a habit, due to environmental conditions and poor bringing up, results in the over-emphasizing of a person's own assets and belittling the gifts of others. The other usage is merely the logical result of physical laws. Just as two objects can not occupy the same place at the same time, so a person can not do two things in a limited amount of time as well as he could do one of them alone. If a person is debarred from certain activities he has more time to spend on others. Lack of one ability does not create other abilities. It merely allows more time for practising them. If Darwin's health had been better and if he had led a more

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complicated life he might not have had time to get as much data together as evidence toward the validity of his theory. A person with few social contacts has more time to accomplish worthwhile work than does one who has to fulfil a variety of social engagements throughout the day. The reason the poor boy makes good is not always entirely due to his strong purpose. The fact that he has evenings uninterrupted by social demands has its effect also.

The mind not only needs the food of the proper kind of experience but it needs time to assimilate what it feeds upon. An enriched mind cannot easily come from a too crowded life. It comes from a life full of constructive experiences which have become a part of the apperceptive background and can play a part in future experiences.

When pathological mental conditions are attributed to failures in compensation, as Adler explained feeble-mindedness, a wrong interpretation is suggested, since the trouble has been proved to be due to native incapacity while the term "compensation" implies a capacity that could be used.

A Course in Practical Psychology:

Modes of thought which are exaggerated in the border-functioning group, could well be considered the result of the failure of our educational system when found in the normal population. Bad mental habits such as are commonly met with could well be pointed out to high school and college students and shown to be due to careless habits of thinking and reasoning into which it is easy to fall. Study of modes of thought could well make up a large part of the subject matter of a course in practical logic. Such a course should not be elective, but should be required of every student even those who will not later specialize in philosophy. In such a course students would be encouraged to see how careless habits of thought and reasoning may gradually develop in

connection with their desires and prejudices. They should be helped to see how failure to consider all the facts and to reason things out clearly has resulted in mental habits which are inconsistent with their intellectual ability and their guiding principles.

It is evident that psychoanalytic methods are unable to accomplish all that their adherents claim for them. Scientific psychology has demonstrated the absence of authenticity of the tenets underlying the hypotheses. Furthermore, advisors in the field of applied psychology are beginning to realize that sound advice can not be given unless it is based upon scientific findings. If, however, in spite of their own lack of logic, psychoanalytic teaching should result even in inspiring a course in logic for normally functioning students it would be no mean achievement and would compensate for much of the unintentional harm that the movement has caused. What if the teachings which first brought the movement to attention do prove valueless? Often the greatest contributions derived from researches have little to do with the ideas with which they originated. After all, Columbus is not famous for discovering a way to the East Indies as he had planned, but for discovering America of which he had never dreamed.

Mental Functioning Not Under Direct Control:

All experiences increase the unconscious reservoir which can function with little awareness and thus free the mind to function at higher levels. Mental integration cannot occur by an act of will any more than can physical and chemical changes in the body. An individual can only put himself under favorable conditions when data is integrated without effort and with little awareness. It is a process which takes place when sufficient fuel is available to permit the brain to work according to its potential capacity. A period of

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mental laziness after trying to assimilate new data is essential to its efficient use. "Retroactive inhibition" is a negative process, which is neither retroactive nor inhibiting, for it refers to a situation arising from lack of time for the integration of data before some new mental activity interferes.

Examples of the normal unconscious — or unaware-functioning — may be demonstrated in all waking life from habits of daily routine to habits of thought which are consistent with accepted principles and ideals. An opposite-analogies test, such as is found in the Terman-Merrill examination, in which the completion of sentences depends upon an unconscious acceptance from the context that an opposite is required although other completions would be grammatically correct, is an example of the proved importance of the unaware functioning of the effects of past experience in normal mental development. It is an example of the way in which the foundations of the normal mind, after a process of unconscious reasoning, furnish clues to the correct type of response.

Mental Deterioration and Early Stages of Normal Development:

When we think of pathological mental conditions as due to the activity of lower uninjured cerebral pathways, we are thinking only of persons who are so mentally impaired that they are no longer able to make pertinent use of their unconscious potentialities. Other persons who are not so deteriorated use the whole brain though slowly and with difficulty. Many examinable persons fit into the Kraepelinian thesis of weak associations. Others comprise a group that has special difficulty in carrying through the response phase. In states of extreme deterioration, however, we do not find even slowly controlled associations but instead of this there is a condition which is a mental freak, typical of

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neither savage, nor child, nor of the lower animals. For normal children, savages, and animals have normal perception and ability to respond which is commensurable with their experience and innate capacity.

In dream states and in pathological mental conditions, we see the functioning of stray words and phrases without control. Studies made under such conditions or by any method which is dependent upon uncontrolled associations, or upon controlled associations which are readily responded to by persons at a low level of mental development, seldom furnish clues to the cause of maladjustment and are practically useless.

The Real Self:

That a psychosis shows the true personality, the "real self," is a gratuitous assumption. The real man cannot be recognized in what is left of isolated experiences or instinctive uncontrolled tendencies. The real self has gradually been built up as a result of choices and consequent habits, which are based on abilities, beliefs, and aspirations. To think of the real self as the activity which takes place after the brain has ceased to function normally, and when a person is really no longer capable of showing how far he had progressed in his evolution from undifferentiated tendencies to a well integrated personality, is as far from the truth as it would be to think of a man as lazy if he were physically unable to move.

Future Possibilities in the Concept of Time:

If in the future more consideration is given to the time factor as it effects normal and pathological conditions, it may lead to a generally different conception of mental organization. Special fields of research may be more subordinated to the problem of human adjustment and become

means to further knowledge of psychology in general without being ends in themselves as much as they have tended to be.

The Future Role of Language:

With clearer understanding of the distinction between efficiency of functioning and intellectual level, it may be realized that what is thought of as a "lack of verbal co-operation" is closely related to lack of ability to experience the type of thinking for which words stand. As a consequence there may be fewer attempts to study the higher thought processes of human beings by observation of animals who are incapable of the kind of mental activity on which it is hoped that light will be thrown, even though much research will probably be directed to the study of basic mental capacities which are propaedeutic to the expression of mental phenomena at human levels of intelligence. There will undoubtedly be clearer realization that adequate study cannot be made of the mental processes without consideration of the language factor, the quality of which distinguishes persons of great intellectual ability from the rest of mankind, and on which advance in the arts and sciences and all characteristically human learning depends. The old idea as to the importance of language in the thought processes which has been strongly emphasized by Roback and Thorndike, undoubtedly had a sound basis. The move away from language studies to what was termed "pure thinking" was largely the result of failure to realize that the highest levels of thinking are impossible unless the ideas can be formulated symbolically and the symbols be used in subsequent mental activity.

With clearer recognition of the likeness between mental processes which accompany different kinds of symbolic responses, and with better standardization of tests with weight-

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ing in units which are directly comparable, language studies will undoubtedly again assume their place of importance in psychological research.

Union of Academic and Clinical Psychology:

It is possible that with better understanding of mental organization there may be a happier union of academic psychology which has tended to overlook individuals, and clinical psychology which, as practised in many places, has tended to disregard the importance of scientific methods. It may be that clinical material will be used to guide laboratory work in such a way that it will lead to better understanding of human nature, and to recognition of the importance of approaching psychological problems in a forthright manner through study of the individuals who compose the social groups.

The usual academic methods, especially in their emphasis on statistical procedures, might be likened to what a doctor's method would be if he relied upon health averages and had never had a chance to learn how different organs were related in their functioning, and if he drew his conclusions merely from the application of the law of probability. On the other hand, the method of persons who specialize in what is referred to as "individual" psychology has often been like the work of kindly neighbors who are ready to help and to advise the sick, who use common sense, and who may on the whole do much good providing one can forget the mistakes often made; but who lack both education and training necessary to cope with unusual conditions. The union of the important aspects of the two with the possibility of distinguishing between behavior which is environmental in its causation and that which is constitutional, may possibly give new impetus to psychology both as a science and as an art.

Education of a Psychologist:

As one considers the different systems of psychology which have waxed and waned during the last half century, it seems as if each might have contributed more to the understanding of mental organization if their protagonists had been familiar with the changes that take place during the process of developing intelligence, and if they had understood how adults differ from children of equivalent mental level. A knowledge of the changes in efficiency of mental functioning as they are related to normal and pathological conditions would also have been revealing. But the education of psychologists was not planned with the purpose of teaching them to know and understand the functioning mind. None of the exponents of the different systems of psychology had studied the normal mind in its various phases as a basis for understanding differences which are characteristic of pathological conditions. Even fairly recently, psychology, as academically controlled, seems to have resolutely set itself against gaining knowledge — at least as far as recognized research is concerned — by studying the one thing pertinent to the subject, namely the complex factor of intelligence which is basic to significant differences in human ability, and its changes under different conditions.

If all psychologists were obliged to serve a psychological internship similar to the internships of medical doctors, and if it were a minimum requirement in their education that they be thoroughly familiar with the anatomy of the normal mind before they began to study malfunctioning and pathological subjects, there would be an acceleration in all fields of psychology. Ideas as to the essentials and non-essentials would become clarified and psychology would begin to assume the rôle for which the world has long been ready and of which the present-day world is much in need.

Psychology in a Regulated World:

If ability to adjust to a changing world be considered a criterion of intelligence, then the degree to which a person has abstract-reasoning-generalizing ability and can apply this capacity to new situations is the essential gift. But if adjustment to a static world — the possible world of the future in which few problems arise — be all that is necessary for success, then mental efficiency as shown in the timing of complete mental processes which would function at a certain minimum level of intelligence would become the important factor in adjustment. It may be that what is now thought of as average intelligence will become the optimum amount needed in a future in which there will be no new worlds to conquer and in which all activities, after having first been fixed by decree, will later become habits and finally, after aeons of time, show as fully developed instincts which function without training. In that future, experiences of the higher intellectual levels will probably show only as esoteric pleasures enjoyed by the few who retain vestigial traces of such capacities.

CHAPTER XV

SUMMARY

The principal results of the author's investigation may be summarized as follows:

1. The establishment of the principle that efficiency of mental functioning is a significant factor which is distinct from level of intelligence. Its control permits better understanding of the relation between intelligence and ability to make social and vocational adjustments.
2. The development of a method to probe the underlying mental capacities responsible for given results in mental functioning. Hence, in a sense, the method lies in the orbit of dynamic psychology but it differs from psychoanalysis in that it is free from the pre-suppositions of the unconscious and does not presume to ascribe individual differences to repressions of affect. Furthermore it is subject to experimental control.
3. The conclusion that in determining the significance of underlying capacities relationships are more significant than the various phases of mental activity such as perception, memory span, learning, and motor

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speed and control, considered separately. These relationships comprise:

- a. The relation of mental efficiency to level of intelligence.
- b. The relation between the separate phases of mental functioning. For example, the relation of span or promptness of perception to learning; or perception and motor control to effectiveness of response.
- c. The relation between each mental phase and mental functioning in general. This brings out specially strong or weak factors the condition of which must be understood preparatory to any constructive work.

These facts have direct application both to pathological mental conditions and to problems in education, since they throw light on different types of mental ability which, while having equivalent quantitative rating, must also be considered qualitatively because of marked variations in the kind of intelligence and in the efficiency of its different mental phases.

4. Our method has disclosed that different types of personality are related to characteristic profiles of mental functioning. The underlying differences in efficiency of functioning are seen to be fundamental to the development of contrasting types of personality which heretofore were recognized only in their superficial aspects.
5. Mild stages of mental impairment as brought out by measurements made under controlled conditions are

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a matter of deviations from normal time limits. This shows either in too slow or too quick associations, or in an abnormal synchronization of different phases of the mental process. These findings have thrown light on causes of maladjustment which are found in early stages of dementia praecox and hypomanic conditions, thus furnishing an instrument for the early detection and understanding of mental states which when exaggerated, are readily recognized as of a pathological nature.

6. It has further been brought out that the mental efficiency of neurotics and of the alleged psychogenic psychoses lies between that of normal and extremely deteriorated conditions. This enables us to subsume different mental classifications under the concept of efficiency of functioning in its relation to intellectual potentiality, and to envisage them as subject to the same psychological laws.
7. As a result we are furnished with a psychological explanation of mental disorders which brings normal and abnormal mental conditions together under the same laws; which distinguishes psychopathology from clinical psychiatry; and which gives psychology its rightful place among other recognized sciences.
8. One of the more important findings may be formulated as follows: The normally functioning mind at each higher level of intelligence depends upon the relegation of an increasing amount of mental activity to the realm of the unconscious. Conversely, the pathological mind is incapable of making effective

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use of its unconscious foundations. This satisfies the law of parsimony in that it interprets different pathological mental conditions in terms of differences in the efficiency of functioning of underlying mental factors and their relations to each other and to the functioning whole.

9. The unconscious is the consequence of the effects of an accumulation of experiences and learning which, when integrated with the effects of other experiences, forms the foundation on which effective intelligence is built. This observation has its basis in anthropological studies and in the study of normally and slightly abnormally functioning persons. It emphasizes the paramount value of the last of the instincts to mature — the instinct of intellectual activity — and recognizes the value of education and experience in the development of character and personality.
10. The thesis has been confirmed that the amount of mental activity which can be carried on unconsciously, or at very low degrees of awareness, is positively related to abstract-verbal ability. This has shown the necessity for the control of abstract-verbal level in scientific studies and has exposed one cause of the inconclusiveness of much psychological research.
11. The human mind is distinguished from that of lower animals by the qualitatively different way in which it can make use of the effects of experience. This is shown in ability to carry on mental activity in complex units of a subjective nature with the ability

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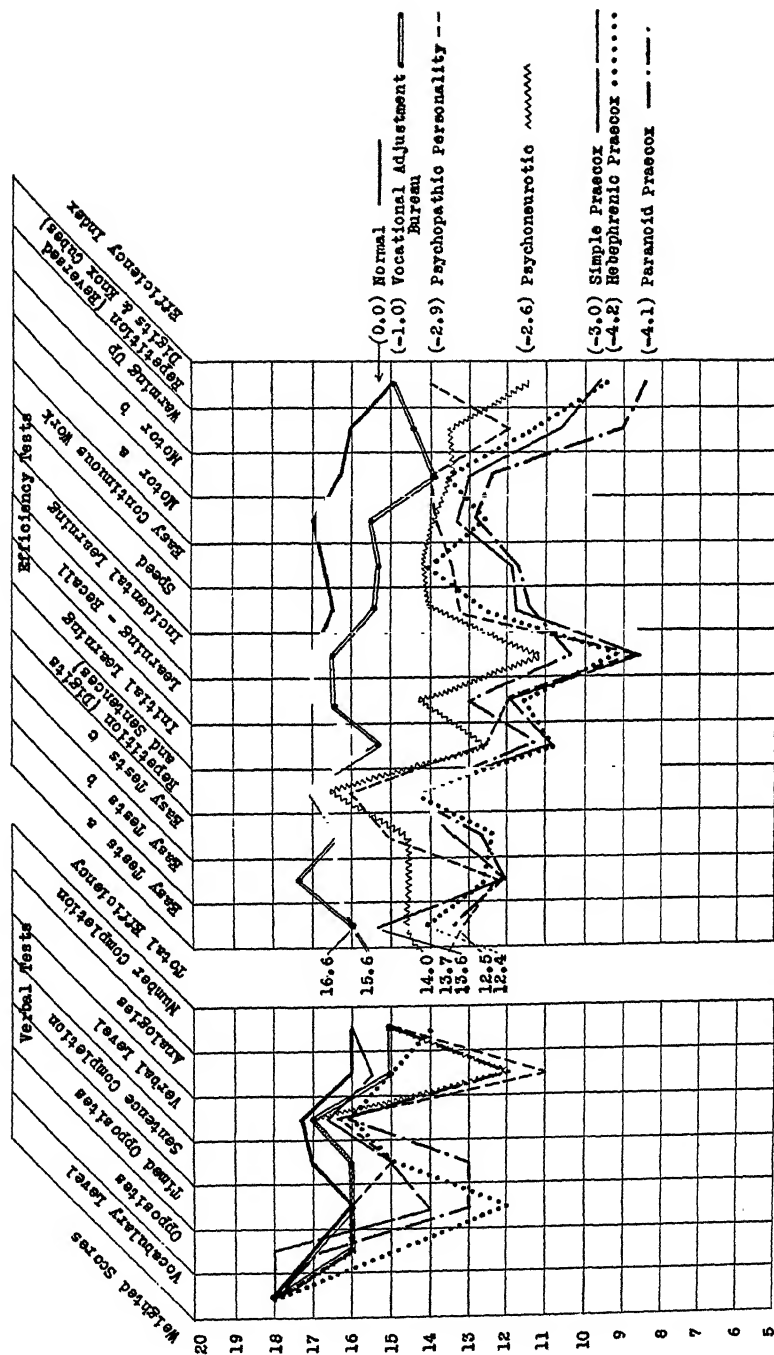
to express the results by symbols which can be used as instruments in future thinking.

12. The importance of the distinction between the inner and outer environments of the mind has become evident. The inner environment is the neuro-physiological condition which is usually congenital and may be changed by disease or general physical conditions. Its improvement lies in the special field of interest of the medical profession. The outer environment is the social milieu and includes the effects of all experiences. It enriches life; it furnishes the bases of sound judgment; and it gives opportunity for the development of habits of thought which are fundamental to the growth of character. Control of the effects of the outer environment belongs in the field of education.

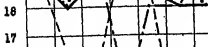
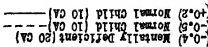
As a corollary it may be stated that the determination of the mental effects of both the inner and outer environments, regardless of cause, belongs in the special province of psychology.

A P P E N D I X

Graphs

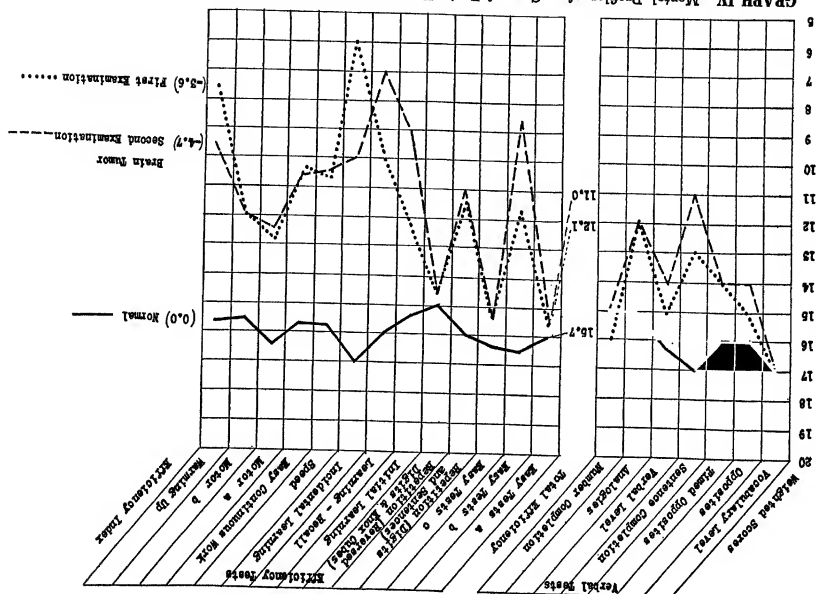


GRAPH I. Comparison of Mental Profiles of Normal, Neurotic and Praecox Groups.

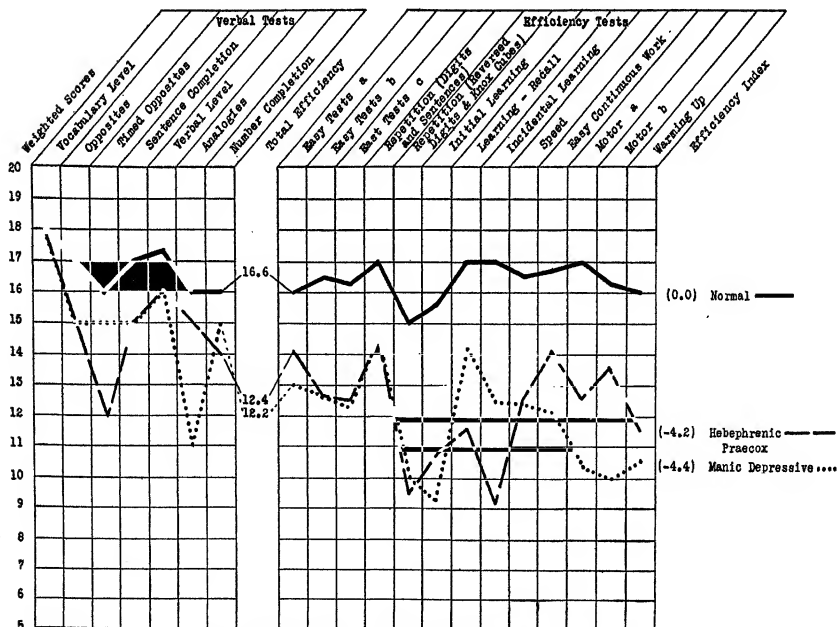
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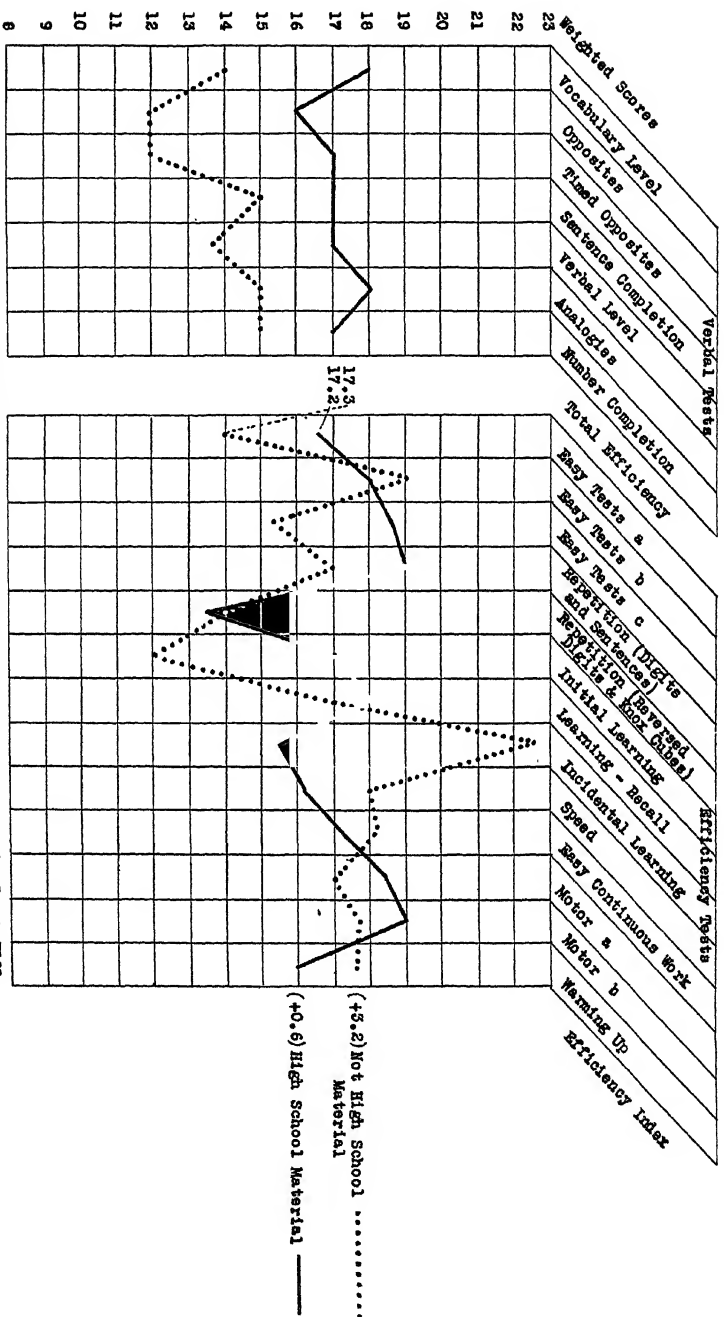
GRAPH III.

GRAPH IV. Mental Profiles of a Case of Brain Tumor after Surgical Recovery: Four Month Interval between the Two Examinations.

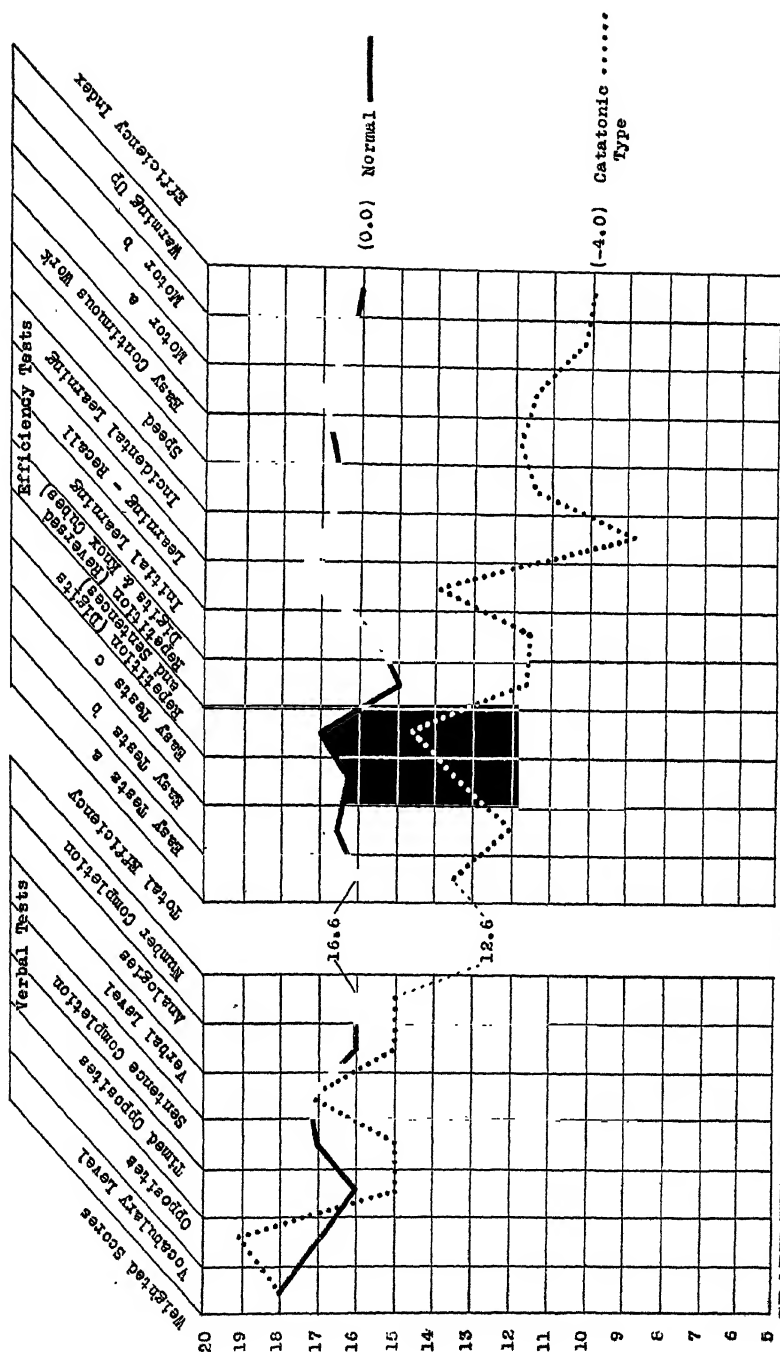


GRAPH V. Comparison of the Mental Profiles of Hebephrenic Praecox and Manic-Depressive Subjects.





GRAPH VI. Comparison of Mental Profiles of Two Persons with Equivalent Efficiency Scores, only One of Whom has Capacity for Academic High School Work.



GRAPH VII. Mental Profile of Non-adjustable Catatonic Type compared with Norms.

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